Pit and Quarry

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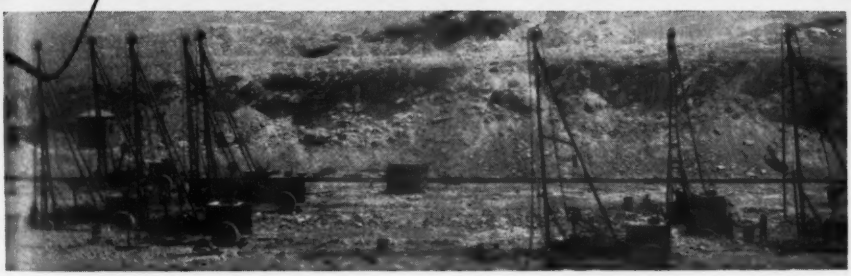

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The Sanderson-Cyclone Drill Co.

Orrville, Ohio.

Eastern and Export Office:
30 Church St., New York City

March, 1924

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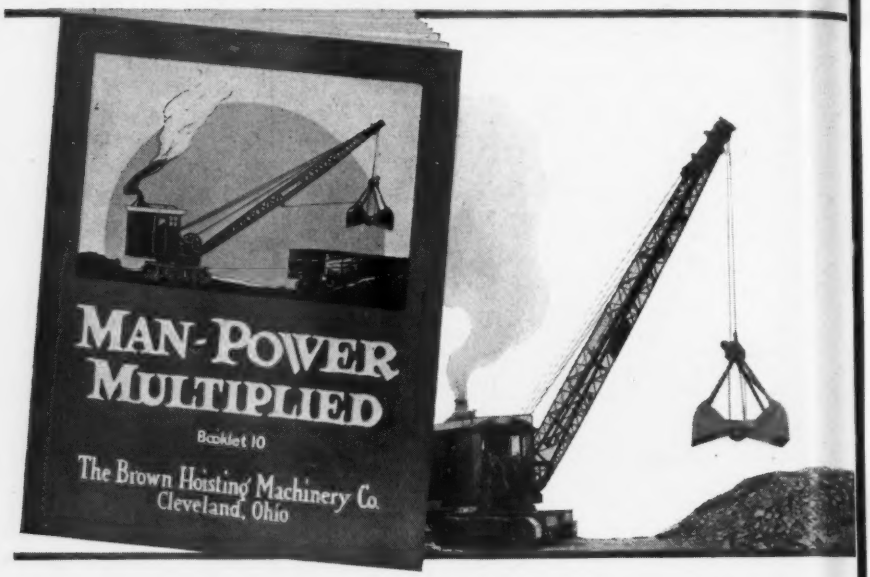

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Pit and Quarry

Member Audit Bureau of Circulations
A Monthly Journal for Producers of Sand, Gravel, Stone, Cement, Gypsum and Lime

VOL. 8 CHICAGO, ILL., MARCH, 1924 NO. 6

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A Barber-Greene loading from a hard gravel bank, San Benito County, Calif.

Loading 4 yards in $2\frac{1}{2}$ minutes direct from a hard bank

Loading direct from a hard gravel bank 10 feet high, a Barber-Greene Bucket Loader filled 4-yard trucks in 2½ to 3 minutes, handling them as fast as they could come.

This was on San Benito County work in California. The superintendent of another county job has called his Barber-Greene "one of the best pieces of equipment that Hickman County has."

Feeding from bank to trucks and wagons, this loader handled 362 cubic yards in 7 hours, despite the fact that there was considerable waiting between loads. The introduction of the Barber-Greene eliminated a gang of 15 men.

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Even with these low requirements, Mr. Whitman, secretary of the company, writes: "We used to have 8 teams doing this work, and bought sand by the load. Now we own a pit and do our own hauling. We figure that the saving will just about pay for truck and loader this year."

The Barber-Greene works in any bulk materials, and with its patented disc feeder, abolishes the shovel clean-up.

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Pit and Quarry

Vol. 8 Chicago, Ill., March, 1924 No. 6

Institutional Management

THAT institutional management is a money making proposition is certain. At the recent convention of the National Crushed Stone Association in St. Louis, this fact was again proved convincingly. Several operators told of their experiences in handling labor with institutional methods and contributed many interesting examples of the success of those methods.

In one case the operator employs the colored laborers of Tennessee. Here the labor situation has been seriously affected by the movement of the negroes to the north. This operator, however, has experienced no difficulty on this account because of the attitude of the employer toward the laborers. They are treated like human beings, helped in many ways, and given satisfactory working conditions. The result is that the men are attracted to the quarry and when once employed, have no wish to leave. This reduces the turnover to a negligible quantity. In another case an operator who uses the white labor of the northern Mississippi valley told of a similar experience in handling his men.

An operator from the state of Iowa has an interesting method of winning the loyal cooperation of his employes. He has worked out a plan of rewarding the workmen so that they can earn extra money. He also provides opportunity for recreational activity in the form of social events, picnics, rifle shooting matches, and such amusements as make life pleasant and bring more enthusiastic workers to the plant. A store is operated for the benefit of the men and not for the purpose of making large profits. This has greatly strengthened the bond of good will between employes and employer. He states that he is not troubled with that largest item of cost in the stone producing business, namely—labor.

These facts are most gratifying to us. For a number of years articles have appeared in this publication on Institutional Management. We have long believed that the intelligent handling of men would bring far reaching results; that loyal service for a respected employer is more profitable than dull drudgery for a wage. Laborers who have pride in working for an employer will be the greatest factor in increasing production

More Poppy-Cock?

In their February 9th issue the publishers of Rock Products display a certificate signed by the secretary of the National Crushed Stone Association addressed "To Whom It May Concern." It certifies two things: (1) that the editor of Rock Products was appointed "Chairman of the Program Committee to prepare the program for the 1924 Annual Convention of the National Crushed Stone Association, and (2) that Rock Products has been given the exclusive right to publish the complete proceedings of the convention, compiled and indexed in the form of a manual of quarry practice."

Why the certificate? Does the Association fear that otherwise some other editor might appoint himself chairman of their program committee and prepare a program for their convention? Hardly. Evidently, the editor of Rock Products would not have done that without invitation. But it would seem that invitation should suffice.

Regarding Rock Products having been given "exclusive right to publish the complete proceedings of the convention, *compiled and indexed in the form of a manual of quarry practice*" . . . that means quite another thing from their first statement in the same advertisement claiming, in bold type, "*exclusive*" right to the "*publication of the transaction.*"

Our readers will discern that this last quoted statement is misleading; that omission of part of their "certificate" gives an erroneous impression. If any "exclusive" right was granted it probably was to publish the proceedings *in a certain form* but not to the "publication of the transactions" for the transactions of the Seventh Annual Convention at St. Louis, January 21st, have already been reported in the February issue of PIT AND QUARRY and also in another publication. In fact, letters complimenting PIT AND QUARRY'S report have been received from many association members, including Secretary Sandles.

While, in the February 23 issue of Rock Products the same "certificate" is reproduced, the accompanying text reads that "the publishers of Rock Products are not so small minded as to *prevent previous publication by its contemporaries.*"

Why the "certificate?" Is this more poppy-cock?

County and City Benefit from Hard Surface Roads Like This

Good Roads Appropriations Exceed a Billion Dollars

THERE are in the United States, according to the United States Bureau of Public Roads, a total of 2,819,386 miles of country highways. As nearly as it is possible to approximate the extent of the paving on these highways, it appears at this time that the mileage of the various types of pavement in use is as follows: Gravel, 175,000 miles; macadam, 100,000 miles; bituminous (asphaltic) macadam, 20,000 miles; cement concrete, 25,000 miles; sheet asphalt, asphaltic concrete, asphalt block, etc., 10,000 miles; brick, stone block and miscellaneous, 10,000 miles.

GOOD ROADS SITUATION

According to the U. S. Bureau of Public Roads, the mileage of the various types of pavement in use is as follows: Gravel, 175,000 miles; macadam, 100,000 miles; bituminous (asphaltic) macadam, 20,000 miles; cement concrete, 25,000; sheet asphalt, asphaltic concrete, asphalt block, etc., 10,000 miles; brick, stone block and miscellaneous, 10,000 miles; total (exclusive of sand-clay construction) 340,000 miles of paved roads. Total mileage of all country highways is 2,819,386, leaving nearly two and one-half million miles unpaved.

Total (exclusive of sand clay construction) 340,000 miles of paved roads.

Build 40,000 Miles in 1923.

The latest estimate compiled by the United States Bureau of Public Roads, shows that approximately 40,000 miles of surfaced roads were completed in 1923.

The 1922 paved road construction program approximated 37,000 miles, of which 6,000 miles were of concrete, sheet asphalt and asphaltic concrete.

Traffic on the main roads has now become so heavy that the excessive cost of operating motor vehicles over bad roads outweighs the cost of constructing good ones. Thirteen million motor vehicles are now using our highways, compared to 1,711,339 in 1914. Manifestly, therefore, the needs of the nation will call for a vast paving program for at least 25 years, and beyond that time, traffic conditions will no doubt call for even greater effort to meet new and more pressing conditions.

It is pertinent, of course, to consider whether the people will go forward with this great road building program. The answer is that the sum

There are 2,500,000 Miles of Unpaved Roads in This Country

The Picture at the Left Shows What This Road Once Looked Like

of $1,000,000,000 annually is already being spent for new streets and roads. Motor cars and truck owners are already paying more than $400,000,000 annually in taxes for road purposes. These people are also paying stupendous sums for gasoline, oil, tires, insurance and other maintenance, and it is a matter of sheer economic necessity that operating costs be kept to the minimum through the construction of good roads.

Large Appropriations Made

The federal government, in the face of rigorous reductions in the budget, appropriated $205,000,000 to be expended during 1922, 1923 and 1924 in conjunction with an equal amount from the states. A total of $781,228,384 in bond issues, exclusive of federal aid, were reported from Aug. 1, 1922 to Aug. 1, 1923, as being under contemplation in the states, counties, townships and road districts of the country. The sum of $617,029,537 was actually authorized during the same period preceding.

It will readily be seen, therefore, that road construction is going forward at a rapid pace, all of which means a great impetus in the development of the rock, sand and gravel industries not only in 1924 but for a long time to come.

Wisconsin has decided to purchase 1,025,000 barrels of cement at $1.65 a barrel, to be used in road building during this year. This price is 5 cents higher, delivered at Wisconsin points, than that of 1923.

Reorganize Michigan Highway Department

Michigan's state highway department has been reorganized to a considerable extent. In the field organization the district plan has been abandoned. There are now five subdivisions for general supervision in charge of five supervising engineers, instead of eight districts with permanent district officers.

G. C. Dillman, deputy commissioner, has been made chief engineer, and F. D. Fitzgerald, office manager, has been made business manager. The position of contract engineer, held by F. D. Messenger, has been abandoned and a new division of materials and equipment created under his direction.

This Sand Hardens

In the neighborhood of Tamms, Ill., are deposits of so-called silica that are claimed to have peculiar attributes, chief of which is that the material, when exposed to the air, hardens and becomes of the consistency of concrete. Officials of Marion county, Ill., who are to superintend the construction of roads, are reported to be considering this material as a substitute for concrete. The International Silica Co., Cairo, Ill., owns the deposits, it is stated.

The Winchester Gravel Company, Winchester, Ind., has filed certificate of preliminary dissolution.

Simplified Operation At This Crushing Plant

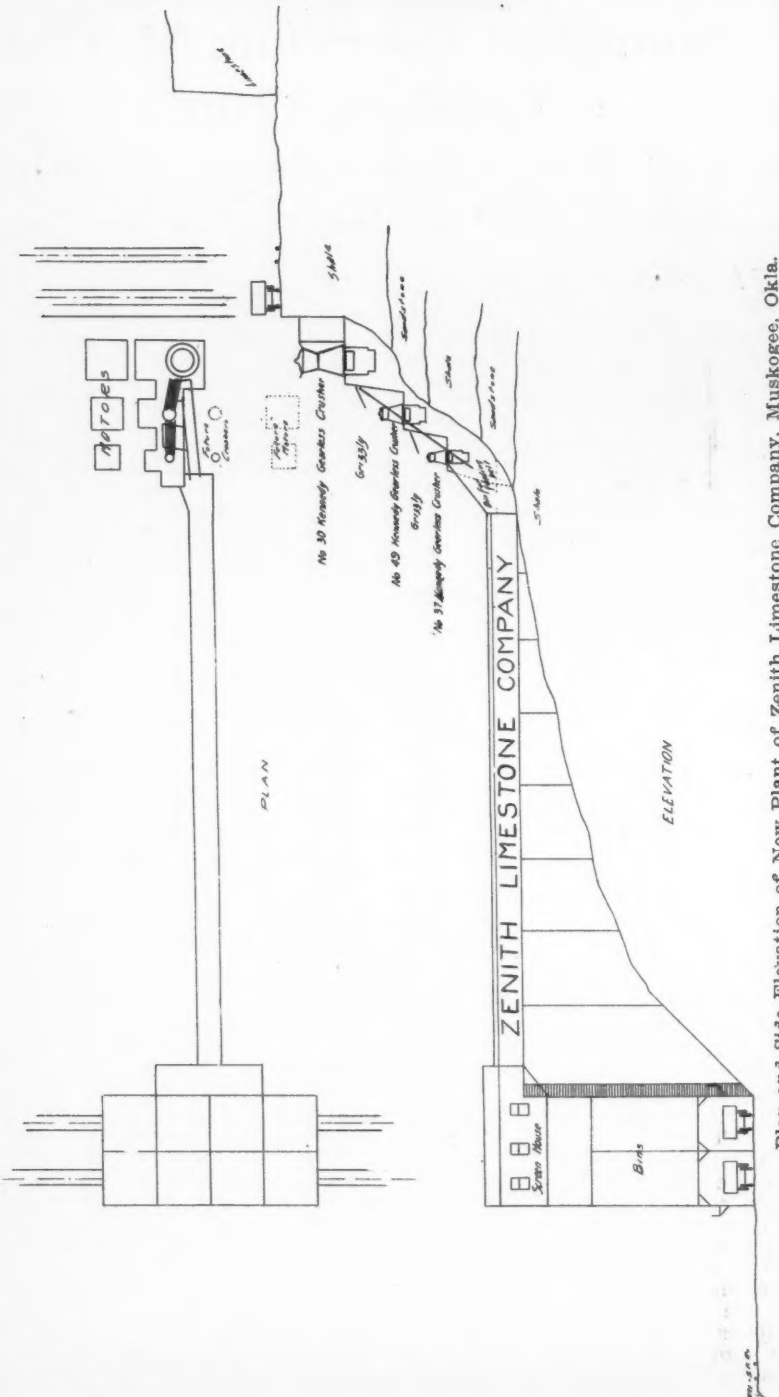
Zenith Limestone Company of Muskogee, Okla., Builds Plant That Utilizes Gravity to Fullest Extent and Makes Necessary Use of Little Power for Conveying.

WHEN Mr. Richard D. Long and Mr. Harry Bell of Muskogee, Okla., decided to go into the limestone business they agreed that they would make the sky the limit and, to be sure that there would be no limit even to this skyward tendency, they named the new company the Zenith Limestone Company. The writer is tempted by this choice of name to indulge in a few figurative expressions about new stars in that portion of the heavens that is reserved for limestone producers but is restrained from doing anything of the sort by the sobering thought that there is nothing heavenly about limestone production. It is of the earth earthy. The canons of good taste forbid our extending this expression to the subterrestrial regions where producers are in times of vexation wont to consign the quarrying business and everything thereto pertaining. But that's enough punning and quipping on the corporate title of a good stone crushing operation. Let's get down to a little consideration of the operation itself.

First, gentlemen, meet Mr. Bell and Mr. Long. Both these gentlemen have lived and worked many years in the section of Oklahoma in which the new quarry and crushing plant are located. Their interests have been widely diversified and they bring to the new enterprise experiences from other fields which may or may not prove of considerable value. Mr. Long has taken charge of the plant construction and will manage the operation after production has begun.

Dick Long is known among a wide circle of friends and acquaintances as a mechanical genius. He has been engaged in many enterprises in and around Muskogee and Tulsa and has developed or brought about the development of a number of new devices, particularly in the street railway field. He approached the subject of designing a plant for the new operation with the idea of making it as simple as he possibly could and this desirable feature has, it seems, been realized in the final design. At only one point in the process is stone moved with the use of power. The quarry is located on a hillside and it would naturally occur to a producer to utilize gravity as much as possible in conveying the stone through the process. In many cases, however, plant designers are content to let this force of gravity merely convey the stone to the plant, thus imposing upon themselves the necessity of re-elevating it a number of times to get it through the various pieces of machinery required for crushing and screening.

Mr. Long so designed the operation that gravity is utilized not only to get the stone to the machines but also to get it through them. The side elevation view shown with the article indicates clearly just how this is done. If the contour of the ground at the plant side had permitted it, he would, of course, have dispensed with the belt conveyor running from the crusher to the screening house, locating the screens directly below the last crusher. However, with the contour as it is, it would have been necessary to move a great amount of rock and earth to bring the screen house and pumps into a point where gravity would carry the crushed stone directly into the last part of the process. As Mr. Long says, the use of the belt conveyor is the one feature of the plant that he does not like. However, it was much cheaper to install this conveyor than it would have been to move all the earth between where the plant is not standing and where it would have been located to bring about complete conveyance through gravity. This utilization of gravity is, of course, nothing like an original idea, but we are reminded occasionally that some times plants in which this force could be utilized



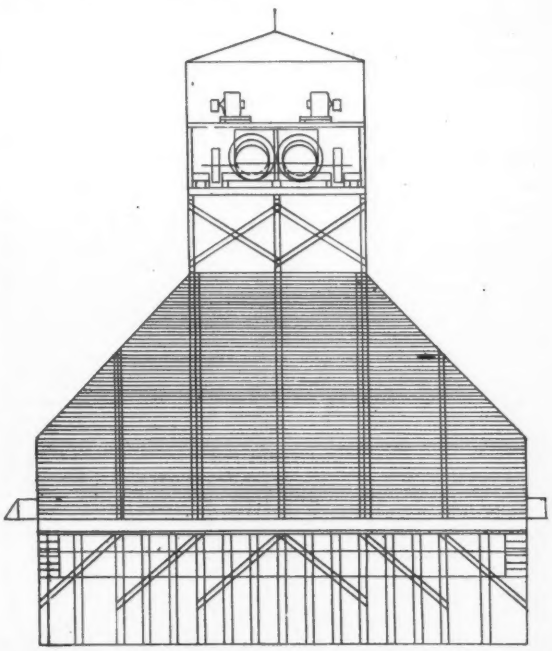
Plan and Side Elevation of New Plant of Zenith Limestone Company, Muskogee, Okla.

View at Point Where Quarry is Being Developed. Note the Large Blocks of Stone That Have Parted from the Main Body

to better advantage are designed to include an amount of superfluous conveying and elevating machinery.

The site on which the operation will be carried out, was intended a number of years ago for a Portland cement plant. Limestone and shale of good quality are present in abundant quantities and disposed in such a way as to permit efficient quarrying. The quarry end of the side elevation gives a general idea of the formation showing how a ledge of limestone, averaging 55 feet, overlies alternating strata of shale and sandstone.

Views of the quarry here shown indicate quite well how this formation gave rise to a number of unusual conditions at the site. After a certain amount of the shale bed below the limestone was weathered out huge blocks of limestone, acted upon by the weather and conditions in the shale bed, parted from the main body of the limestone and slid, often for considerable distances, down the side of the hill of which the limestone forms the uppermost bed. The operators did not intend to attempt the recovery of stone from any of these huge blocks found at various points on the site.

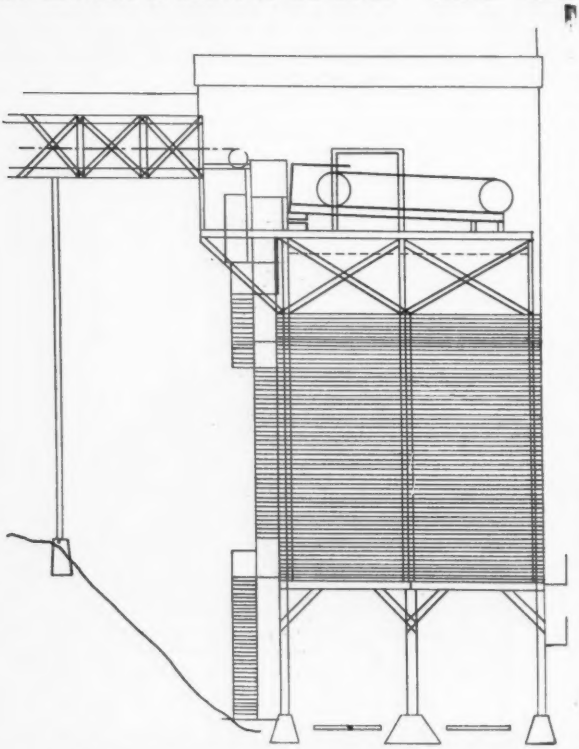


End Elevation of the Screen House and Bins

Another unusual condition on the property is the occurence of a very thin seam of coal between the limestone and the shale. This coal does not constitute an advantage. It is, in fact, a disadvantage, since it must not be allowed to go through with the clean stone. At another point on the property there is a considerable deposit of coal of sufficiently good quality for fuel. Remember also that this property is located in Oklahoma and be prepared to learn that there are on it two oil wells from which considerable quantities of oil are being pumped. It was, in fact, the presence of oil that brought about Mr. Bell's interest in the property. Producers in other sections of the country who are paying out good money for coal and oil will look with a little envy at this operation where fuel is so plentiful and where at the same time, the plant is run by electricity secured at a very reasonable rate.

It was mentioned earlier in the article that this is a hillside quarry and this fact is turned to the advantage of the producers and Henry J. Gravity is made to work overtime. Stone cascades through a series of three crushers and is carried horizontally by a belt conveyor over a distance of about 100 feet into screens whose products are dropped to bins below and from there to railroad cars. This, in brief, is the production plan. Details of this plan may be interesting to many producers.

Drilling is done with an Armstrong well drill. Blasted stone will be picked up by a steam shovel. This machine will load the rock into side dump cars of cubic yard capacity which will convey it to the point at which it enters the primary crusher. This primary breaking machine, a No. 30 Kennedy gearless, will pass its products to a bar grizzly with bars set two inches apart. Rejects from this grizzly will go to a No. 49 Kennedy gearless crusher which will in turn feed a No. 37 Kennedy gearless crusher through another bar grizzly with the same spacing as the one above. Material passed through the bars of both these grizzlies falls to a chute set at about 45 degrees and discharges into a bin at the point where the only belt conveyor in the plant takes up the work of carrying the stone. This belt conveyor is arranged to operate horizontally through an enclosed belt gallery. It is 30 inches wide and has a length of 105 feet between pulley centers. Belt is furnished by the Goodyear Rubber Company. The rollers, idlers, pulleys and transmission equipment are furnished by the Barber-Green Company of Aurora, Illinois.



Side Elevation of the Screen House and Bins

The company has taken advantage of the sides of the belt gallery to paint thereon the corporate title. The Zenith Limestone Company. Pit and Quarry has on a number of occasions reminded producers that there is a little advantage in dis-

playing the names of their plants and takes advantage of this occasion to make the same recommendation again.

At the point at which the belt conveyor is fed, there is, as already mentioned, a large bin which takes the products of all three crushers. At the discharge end of the conveyor there is also a stone box from which are fed the two rotary screens which separate the various sizes and which chute them to bins below. This box or hopper at the screen house has sloping sides in which are fastened lengths of iron at right angles to the sloping sides, so arranged as to permit a quantity of stone to lodge between them and form a protective surface for the sides of the hopper. This will undoubtedly be the means of protecting the hopper from wear to a very considerable extent.

Showing Relative Positions of Two Secondary Crushers

Another precaution to prevent wear has been taken at the point where the hopper under the crushers discharges through a chute to the belt conveyor. Toward the end of this chute, which is set at an angle and arranged to discharge in the direction in which the conveyor is traveling, a number of holes are punched. Thus, the end of the chute is in reality a gravity screen which separates fine material and allows it to drop upon the conveying belt. This means that a blanket of fine material is laid down upon the belt before the stones which are discharged from the end of the chute are deposited. These heavier particles strike this blanket of fines and thus, to an extent, do less harm to the surface of the belt conveyor.

In the screens, products of the Kennedy-Van Saun Manufacturing and Engineering Corp, are produced six grades of material, 2 inch, 1½ inch, 1 inch, ½ inch, ¼ inch, and dust. The output of the screens is dropped by chutes to the bins below. These bins and chutes have features of interest and possibly a description of them would be acceptable. The chutes are made of 10 inch pipe, which size is considered about right to handle conveniently the amounts of material of various sizes that come from the screens. The stone, in sliding down to the various bins, will cut across less than one-third of the inner surface of the pipe. As any particular section becomes worn, the pipe will be turned and a fresh surface exposed to the action of the stone. Mr. Long believes that this method of chuting material will be comparatively inexpensive and very satisfactory. The method is not practiced to any large extent in the crushed stone industries so far as the observations of PIT AND QUARRY editors on their travels can determine. Material is usually sent through open chutes. An account at a later date of Mr. Long's experience with these pipe chutes will be interesting.

The bins form a structure that has a rather unusual appearance but a structure that has a number of advantageous features. A study of the end view here shown and the exercise of a little imagination will show that the sloping sides of the plant are disposed at the same angle to the horizontal as the angle of repose for a pile of stone. The chutes discharge at the highest point in those bin sections that have sloping sides so that the material in assuming its natural angle of repose will fill practically the entire bin.

The bins are constructed of stock 3 inches thick, so arranged that there are alternately 3 inches of wood and 3 inches of air space. These "open work" bins retain material quite well and result, of course, in the saving of a considerable amount of lumber. The writer has observed this style of construction in a number of crushed stone and gravel plants and has seen it work out quite satisfactorily. The stone is retained by walls of this type as effectively as by solid walls.

The bottoms of the bins are made of 3 inch boards on end. A discharge of material from the bins is through clamshell bin gates.

Mr. Long at one time considered roofing the sloping sides, or tops as some may prefer to call them, of the bins but abandoned the idea, arguing that there would be no great benefit in such a roofing, that it would not help to preserve the timbers and that there was no advantage in keeping the coarser sizes of stone dry. The fines are stored in bin sections directly below the screen house and are thus roofed over.

A somewhat similar line of thought caused Mr. Long to abandon the idea of building a house around the crushers which rest in the open on their foundations on the side of the hill. These crushers will be used continuously throughout the year and he believes that exposing them to the weather will not be adding greatly to the influences that naturally tend to wear them out. And so, a general view of the finished plant would show three crushers at different levels on a hillside, connected with the screen house and bins by a belt gallery a little over 100 feet long. With this equipment, it is expected to produce 4,000 tons of stone per day.

Long tail tracks for empty cars are provided and are arranged with a grade of one per cent to permit dropping the cars down by gravity to the points at which they are loaded. The loading operation will be controlled by a man on a walkway along the side of the plant and at sufficient height to manipulate the levers which actuate the bin gates. After loading, the cars drop down to a storage track from where they are picked up and brought to the main line.

Stairways at the plant are all on the outside and are very simply constructed by taking advantage of the space between the boards that make up the side walls. The treads for the stairs are cut a little longer than required and that part of the board not actually required for the tread of width required is fitted into one of the open spaces and there nailed, the building of the stairway going on simultaneously with the building of the walls.

In the construction of the plant, a number of worth while ideas will be worked out. One of these is the use of templates for all the nailing that is to be done. The positions of spikes and nails have all been figured out and the use of templates will insure that this important work is done to the best advantage and exactly as figured out, nothing being left to the workmen in the way of figuring out positions for the various spikes and nails.

All in all, the plant of the Zenith Limestone Company is a very interesting one and there is much in it that the average producer can learn. In its operation will be tried out a number of ideas which will make interesting stories after the plant has had a little operating experience. We hope in some future issue to tell our readers of the way these ideas are working out.

Wabash Buys Ohio Farms

Purchase by the Wabash Portland Cement Co., Detroit, Mich., of two farms lying east of Fairfield, in Bath township, Greene county, Ohio in which neighborhood the company has been prospecting for several months, indicates the establishment of a plant for the manufacture of cement at that point, it is said. The cement company has options on about 15 other pieces of property in that locality.

Testing Concrete Strength

Important experiments have been made in Milwaukee with cement, it was disclosed on January 31 by the Wisconsin Concrete Products Association, in session in Milwaukee. The experiments, which were made jointly with the W. H. Devos Company plant and Marquette university, enable the manufacturer to arrive at a definite idea of the strength of his product. Concrete men are familiarizing themselves with the technicalities of the experiments made.

Lime Production in 1923 Larger

Quantity of 4,057,000 Tons, Valued at $39,413,000, Was Sold in the United States. Construction and Chemical Lime Increased; Less Agricultural Was Used.

ABOUT 4,057,000 short tons of lime, valued at $39,413,000, was sold in the United States (including Hawaii and Porto Rico) in the Department of the Interior, by the Geological Survey, from preliminary reports received from the principal producers. This quantity is more than 11 per cent greater than that sold in 1922, and only slightly less than that sold in 1916, the year of largest recorded production. The average value per ton in 1923 is estimated at $9.70; in 1922 it was $9.14.

Of the 42 states and territories that produced lime in 1923, 16 showed a decrease and 26 an increase in output as compared with 1922. Nearly all the states that showed decrease in 1923 are small producers or larger producers that serve local markets or that supply a demand for special lime products.

Ohio retained the position that it reached in 1922 as the leading state in the manufacture of lime. The growth of the industry in Ohio is due chiefly to the increased output of building lime, most of which is hydrated lime. In Pennsylvania, which was formerly the leading state, there has been during the last few years a decided decrease in the output of lime manufactured for use in agriculture, and no corresponding increase in the sale of lime for chemical and structural uses.

Hydrate Sales Break Record

The sales of hydrated lime in the United States in 1923 are estimated at 1,206,000 short tons, an increase of 9 per cent over those in 1922 and the largest yet reported. Of the 31 states that reported an output of hydrated lime in 1923, several showed a small decrease, but the increase in such states as Ohio, Pennsylvania, Missouri and Virginia kept the sales well above 1,000,000 tons, the production in 1922. The estimated value of the hydrated lime sold in 1923 was $11,824,000, an average value of $9.80 a ton. The average value in 1922 was $8.92.

Reports to the Survey indicate that about the same number of plants were in operation in 1923 as in 1922. Many improvements were made at plants and kilns in order to reduce the cost of labor to a minimum and to increase efficiency. Wages were high, and at times, especially in the summer, common labor was hard to

Lime produced in the United States in 1922 and 1923 (estimated).

State	1922 Hydrated lime (Short tons)	1922 Total lime Short tons	1922 Total lime Value	1923 (estimated) Hydrated lime (Short tons)	1923 (estimated) Total lime Short tons	1923 (estimated) Total lime Value	1923 (estimated) Average Value per ton	Percentage of increase or decrease in 1923 Hydrated	Percentage of increase or decrease in 1923 Total
Ohio	537,816	752,916	$6,495,066	596,000	856,000	$8,250,000	$9.64	+11.	+14.
Pennsylvania	172,179	719,536	5,581,794	173,000	750,000	6,255,000	8.34	+ 0.5	+ 4.
Missouri	56,024	203,984	1,953,524	64,450	251,000	2,454,000	9.78	+15.	+23.
West Virginia	49,712	210,146	1,643,055	48,000	243,000	2,111,000	8.69	— 3.	+16.
Wisconsin	21,680	189,558	1,589,931	20,350	227,600	2,208,000	9.70	— 6.	+20.
Alabama	15,016	168,135	979,331	14,500	198,000	1,300,000	6.57	— 3.	+18.
Virginia	15,284	152,436	1,251,683	30,600	175,000	1,350,000	7.71	+.90	+15.
Massachusetts	(a)	164,980	2,510,368	(a)	172,000	2,687,000	15.62	0.	+ 4.
Maine	(a)	127,840	1,757,480	(a)	139,000	1,898,000	13.65	— 7.	+ 9.
Indiana	38,832	113,246	938,645	44,000	128,000	1,152,000	9.00	+13.	+13.
New York	(a)	96,320	957,079	(a)	127,000	1,300,000	10.24	—12.	+.32
Tennessee	26,029	126,305	939,039	38,200	124,000	972,000	7.84	+47.	— 2.
Illinois	13,004	85,425	860,945	15,100	91,000	990,000	10.88	+16.	+ 7.
Michigan	(a)	53,635	484,945	(a)	80,800	842,000	10.42	—33.	+51.
Maryland	40,976	71,261	554,194	30,000	66,500	570,000	8.57	—27.	— 7.
California	(a)	55,161	683,774	(a)	65,000	862,000	13.26	+14.	+18.
Texas	21,163	52,552	524,985	22,200	62,000	597,000	9.63	+ 5.	+18.
Connecticut	(a)	52,108	743,742	(a)	59,700	833,000	13.95	+29.	+15
Vermont	(a)	44,745	565,498	(a)	52,000	616,000	11.85	—13.	+16.
Minnesota	(a)	27,670	307,270	(a)	29,700	342,000	11.52	+74.	+ 7.
Undistributed	98,348	171,658	1,932,691	109,600	159,700	1,824,000			
	1,106,063	3,639,617	33,255,039	1,206,000	4,057,000	39,413,000	$9.70	+ 9.	+11.

a—Included under Undistributed.

obtain. The cost of operation was generally higher than in 1922, although coal was more plentiful and somewhat cheaper.

The manufacturer who sold lime in barrels found that the increase in the cost of barrels caused a corresponding increase in the cost of lime per barrel. The demand for lime in 1923 was obviously greater than in 1922, but appeared to vary with local conditions and with the use to be made of the product. The average price in 1923 was higher, but many reports show prices about the same as in 1922, or lower.

Demand for Other Kinds

The demand for lime for building enterprises was moderately large during the first part of 1923, but the general curtailment of construction work early in the year soon cut down somewhat the demand for lime. On the whole, however, this branch of the lime industry appeared to be prosperous. The increase in sales in 1923 will probably be about 17 per cent.

The demand for chemical lime was steadier throughout the year than that for construction lime, and though some manufacturers of chemical lime reported small sales, the total sales in 1923 will evidently be more than in 1922—possibly 12 per cent. The sales of refractory lime (dead-burned dolomite) amounted to about 395,000 short tons in 1923, as against 348,838 short tons in 1922, an increase of 13 per cent.

Although some producers reported a considerable demand for agricultural lime in 1923, reports from the chief producing states, including Pennsylvania, Maryland, Virginia and West Virginia, indicate decreased total sales. The reason given for the decrease in sales is the inability of the farmers to pay the price charged for agricultural lime. Many farmers who burn lime for their own use reported increased output, but the manufacturers of commercial agricultural lime in the same district reported decreased sales. However, the high price of coal, the scarcity of farm labor, and high wages, kept many farmers from burning lime for themselves or their neighbors.

The accompanying table shows the estimated quantity of hydrated lime and the estimated quantity and value of total lime sold in the principal producing states in 1923. The figures for 1922 are given for comparison.

Our New Associate Editor

A new name will be found this month among the list of associate editors on the staff of PIT AND QUARRY. Mr. Harold W. Munday, the latest member of our editorial family, took

Harold W. Munday

up his duties a few weeks ago. The coming of Mr. Munday is in accordance with our policy to serve the best interests of our readers, for he has behind him a background of experience in the industrial and editorial fields that should qualify him to treat with the interests of our readers in a constructive way.

Mr. Munday is an active member of the Western Society of Engineers, the Society of Industrial Engineers and the American Association of Engineers. He is a graduate of Armour Institute of Technology where he received the degree of Bachelor of Science in civil engineering.

The Belvoir Stone & Supply Co., a new concern at Cleveland, Ohio, has purchased a 20-acre tract of land in Nine Mile creek valley, just west of Green road in South Euclid, the price being about $185,000.

All That Was Left of the Plant of the Central Sand and Gravel Co. on September 22

Memphis Company Builds New Plant on Site of Wreck

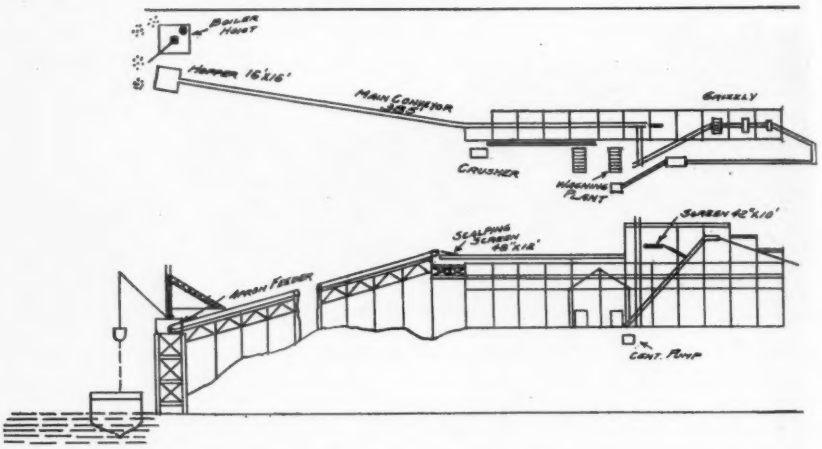
Central Sand and Gravel Company Erects Concrete Structures to Replace Plant Lost Last Fall When Settling of Ground Slides it Into the Mississippi.

THE affairs of the Central Sand & Gravel Company of Memphis, Tenn., arrange themselves in the minds of officials and employees of this company into two general groups, somewhat after the manner in which early Biblical events are divided—into those which happened before and those which happened after the flood. In the case of the Central Sand & Gravel Company, however, the antediluvian Biblical period is paralleled by the period in which they operated a sand and gravel plant that slid off into the Mississippi on September 21st of last year. And so, "before the wreck" and "after the wreck" are terms that mean quite a bit.

This wreck is unique in the history of sand and gravel production. Nothing like it is known to have occured before. It was a spectacular happening that aroused a great amount of local interest, and in addition attracted considerable attention outside Memphis among people interested in construction. The only man that can tell much about the destruction of the plant is the night watchman. He relates that at a time when he was speaking over the telephone he heard a cracking noise which was immediately followed by the collapse of a crane 50 feet in height. From a point of safety about a hundred yards away from the plant he watched the sliding of the structure into the river. This is all that is known of the event itself. Its causes are also rather obscure.

The collapse cannot be considered a structural failure, for the manner in which the plant slid off as a whole shows that the fault was in the ground on which it was built. There was no particular breaking down of parts, but a complete subsidence of the entire plant. It would seem that at a considerable depth there is an amount of quicksand or similar material which oozed away for the ground supporting the structures and allowed everything resting upon it to drop. From all surface indications the ground is all right for building, and the reasonable care that was taken on examining it at the time the foundations were put in indicated that it was entirely satisfactory. The condition which lead up to the catastrophe was so deep-seated as to escape discovery as a result of an ordinary investigation.

No more than five minutes were required to completely obliterate equipment and buildings valued at $150,000. It is estimated that taking



Plan and Elevation Sketches of the New Plant

salvage into consideration the loss runs somewhere in the neighborhood of $75,000. A considerable amount of machinery has already been salvaged. A new $35,000 barge lying directly beneath one of the chute-loaders was not damaged.

However, all this is history, and a more complete account of the destruction of the plant was given in the issue of PIT AND QUARRY for October, 1923. To the history of the accident we now add some news about the building of a new plant to take the place of the one that was lost. The new plant will be similar in many ways to the one which preceded it. In a number of other ways it will differ. Advantages over the old design that have suggested themselves will be incorporated in the new. The work has already been carried pretty well along, and that which still remains to be done will be finished in time to allow the company to get into production within a few weeks.

A simplified sketch of the plant here shown will give a pretty accurate idea of the progress of material through it. On the excavating end work is carried on along lines similar to those followed at other river operations in the same section.

Sand and gravel are secured from the river by a "digger" which loads barges that are towed to the plant and unloaded by a stiffleg derrick located at the waters edge. This derrick is manufactured by the American Hoist and Derrick Company. It is built entirely of steel and, although it has gone through the wreck of the plant last September, is in perfect working order. It is one of the pieces of equipment that was little affected by the catastrophe. As can be seen from the photograph of the wreck, it did not fall, but was tipped

The New Plant As It Looked About February 1

a little bit by the general movement of the plant toward the river.

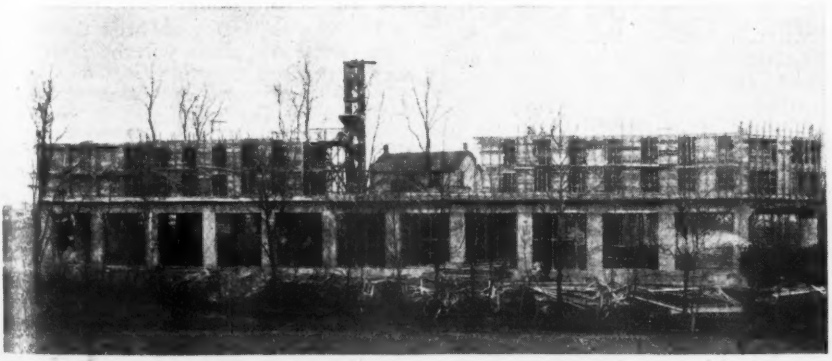
Close to the derrick in its present location are the steam boiler and engine required for its operation. This piece of equipment has a 45 foot radius, enough to permit it to drop its 2½ yard Hayward bucket into any part of the barge and to convey the material thus secured into a loading hopper. At that point along the river front at which barges are unloaded are located six cluster piles which serve as fenders and permit the barges to be brought up close without damage to the unloading equipment. Each of these clusters is made up of 12 cypress logs of 70 feet each. The fenders and the pile foundations for the hopper and hoisting equipment are so arranged that the plant can operate even at the highest water so far recorded. At low water the derrick has a longer lift: at high water a shorter. This is the only way in which the condition of the Mississippi affects the operation of the plant.

Facilities for Unloading Barges

The loading hopper at the river has an opening 16 feet square and is built with sloping sides to permit a feed of sand and gravel to a Stephens-Adamson apron feeder located at the bottom of the hopper. This apron feeder furnishes a steady supply of material for the main belt conveyor which has a conveyor belt 30 inches wide and 385 feet between centers, running on Stephens-Adamson ball bearing rollers. This conveyor discharges at a point 105 feet above zero river gauge into a scalping screen 48 inches by 12 feet. This scalping screen serves the purpose of throwing out oversize gravel into a bin and passing all that goes through the rings to a second belt conveyor 30 inches wide and 100 feet long between centers. A tripper along this belt conveyor may be arranged to throw off bank run material in a number of bins, or the tripper may be passed and material sent forward to the washing plant.

The oversize gravel which was thrown out by the scalping screen and dropped to a bin is fed to a Kennedy gyratory crusher located on the ground below and to one side of the bin. The crushed gravel turned out by this machine is re-elevated and chuted to a bin provided for this material.

Sand and gravel intended for wash-



View of the New Re-enforced Concrete Bins. A Structure Much Better Than the Average

ing is dropped to a washing plant in which the material is freed of impurities and in which solid material such as lignite is removed by jigging. This washing plant is said to be quite effective. It was used for a time before the plant collapsed and will be included without much change in the new plant. Gravel turned out by this washing plant is elevated to a 42 inch by 10 foot rotary screen which separates the material sent to it into two grades, that which is known as small binder and that known as coarse binder.

Other materials from the washing plant are elevated by pump and passed over an inclined screen or grizzly at the top of the plant. This grizzly removes and feeds to a bin the torpedo gravel, permitting the sands to go through into two Stephens-Adamson settling tanks arranged in series. The first of these tanks removes the coarse sand and permits fines to go ahead with the water to the second tank where the fine sands are removed and the tail water allowed to run out of the tank to a settling tank on the ground. Water from this settling tank runs to a pump from which the water for the washing system is secured. Water for the operation of the washing plant is supplied by an 8 inch Amsco centrifugal pump.

One of the very interesting features of this new plant of the Central Sand and Gravel Company is the construction of the concrete bins. They are much heavier than one usually sees and are strongly reinforced throughout.

This concrete bin structure is 200 feet in length and 32 feet wide. The total capacity of all the bins is 3,000 yards of material, this making the operation a rather flexible one and permitting the storage and sale of material at times when production drops off.

The loading of material is in all cases from directly overhead through sliding gates of simple design. The opening and closing of these gates is handled by pike poles and it is said that their operation is very satisfactory.

The mill of the Lakeside Lime Co., Lakeside, Calif., has been closed for the reason that a large crusher, recently installed, did not prove satisfactory, according to reports.

Big Blast Successful

When William Wrigley, Jr., touched the button that exploded the dynamite at Graham Bros. quarry at Pebble Beach, there was only a faint trembling of the hill and very little noise. But many thousand tons of rock came tumbling down the hillside and was broken into smaller pieces that later would be dropped into the mammoth jaws of the big crusher.

The huge blast was a surprise to many Avalonites, who had expected that tons of broken rock would be hurled into the air; a spectacular sight! Modern methods of blasting have done away with the fireworks. You press a button, the electricity makes the contact, and the "rock just separates."

"We have broken out enough rock to last us for nearly six months," said one of the workmen.

In less than an hour after the great explosion, the big steam shovel and the giant crusher were in operation.

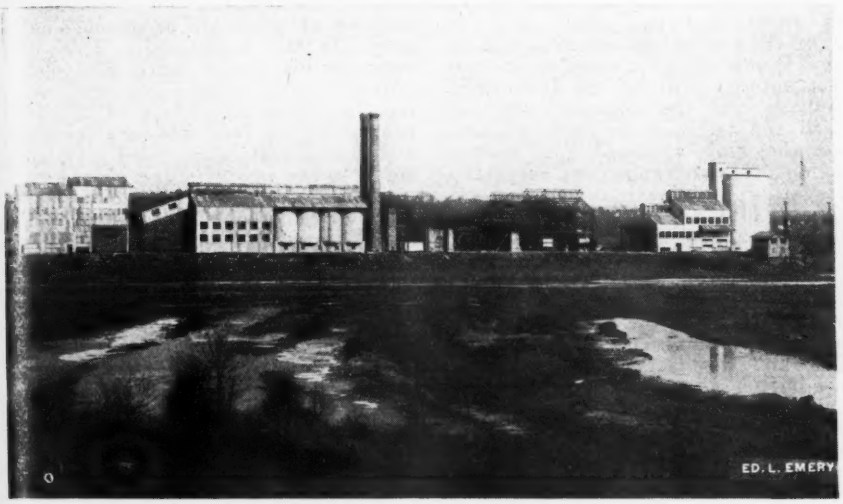
There was no need to sweep up the debris, to carry injured men to the hospital and witness other deeds of confusion. Slowly the gas fumes and smoke of the explosion drifted upwards and off toward the channel.

To one who was not familiar with the topography of the hillside at Pebble Beach, there did not seem to be much change. Gone were the trees and shrubs, the trails the men had made while drilling the holes that penetrated into the mountain, and close examination showed giant rocks weighing thousands of tons split in many different ways.

Many notable personages witnessed the big undertaking.

For the next few months the Graham Brothers plant will be operated day and night to supply crushed rock for the road work and other building projects on the mainland.

Bids are being taken by the Pacific Portland Cement Co., Pacific Bldg., San Francisco for the concrete work in connection with the construction of its new cement plant in Redwood which will cost approximately $1,000,000. W. C. Stevenson, Pacific Bldg., is the engineer. The piling contract was awarded to Duncan-Harrelson Company and is well underway.



General View of the New Hermitage Plant at Nashville, Tenn.

Hermitage Portland Cement Plant Nearly Completed

200 Barrel Operation Now Within Short Distance of Actual Production of Cement to Be Marketed in Southern Territory

THE new 2000-barrel plant of the Hermitage Portland Cement Company, construction of which began last summer, is now practically ready for the production of cement. All the machinery is in place and tests of most of the units have already been made. There still remains to be done such work as the finishing of the haulage track from the quarry to the primary crusher, the completion of the coal pulverizing unit and the work of adjusting the various machines employed in the process. That is to say, this is all the work that stands in the way of the actual production of cement. There is, however, still to be done such work as applying roofing and siding to a number of buildings, clearing away the debris incident to the construction of the plant, and the adding of finishing touches, such as the building of walks and the concreting of places about the plant where the workmen up to this time had been walking through mud.

The plant is of the straight line type, material progressing from the raw end to the cement storage and bagging house through machines arranged to do away with conveying from side to side.

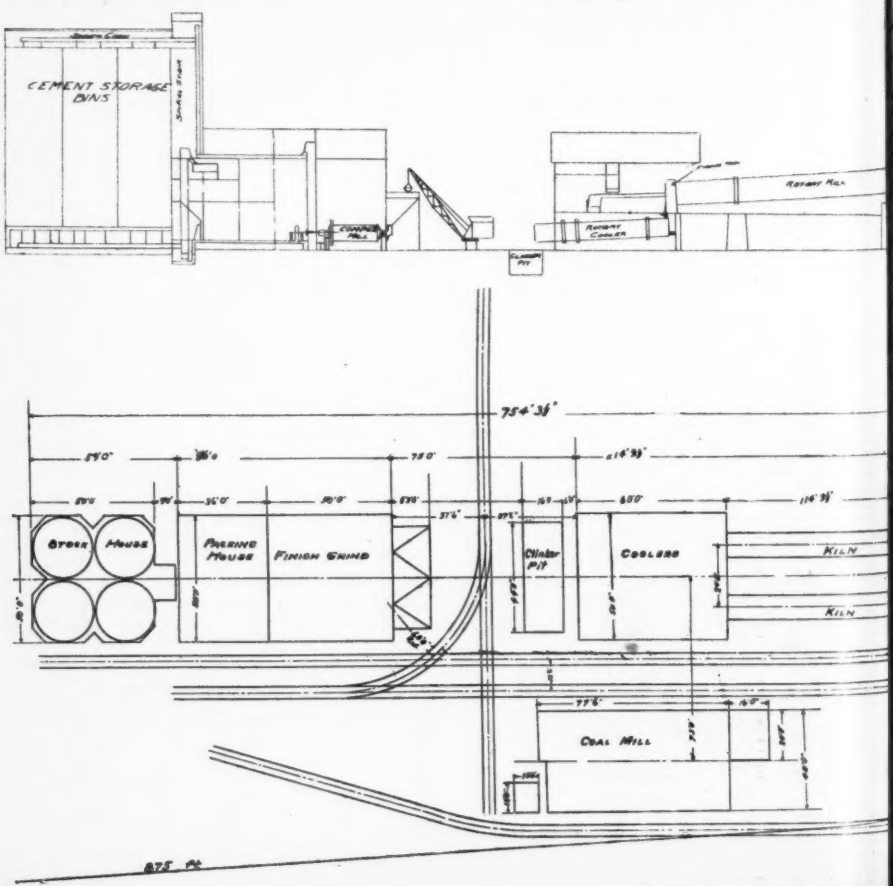
Both the limestone and clay used in the process are secured on the company's property adjoining the plant. The limestone is present in very considerable quantities and is throughout of quite uniform quality, very well suited for use as a cement making material. The quarrying process consists of drilling with an Armstrong well drill, the shooting down of stone from a 50-foot face and the loading of dump cars with a Marion electric shovel. Drilling for secondary blasting is handled by Ingersoll-Rand equipment operating from a compressor located at the quarry.

The clay is secured from a large pit on the property from which a brick manufacturer has been excavating for many years. This manufacturer

has excavating equipment that is larger than his plant requires and so there is mutual advantage in a contract entered into by the Hermitage Company and the brick company in which the latter is to excavate and load the clay required for cement making. This arrangement keeps the excavating equipment at the clay pit going steadily and results in a saving for both parties in the contract.

Crushed stone picked up at the quarry by the electric shovel is loaded into side dump cars and conveyed to the foot of the incline into the plant. The cars are hauled up this incline by cable and discharged into a large steel hopper above a No. 18 N Allis-Chalmers crusher. After this machine accomplishes the first reduction, it spouts the product to a 42 inch pan conveyor 66 feet long between centers and set at an angle of about 45 degrees to the horizontal. This pan conveyor discharges into a 60 inch by 16 foot rotary screen. Material passing the screen drops to a 20 inch belt conveyor, 72 feet between centers, along which it is elevated and conveyed to the raw grinding plant. Provision is made to bypass this belt conveyor and to spout the product of the rotary screen to an outside storage pile from which stone will be reclaimed by a Brownhoist crane and loaded in a hopper set above the 20 inch belt conveyor just mentioned. This outside stock pile will give a certain flexibility of operation between the crushing and grinding plants, permitting the operation of the crushing unit in any way that seems most desirable.

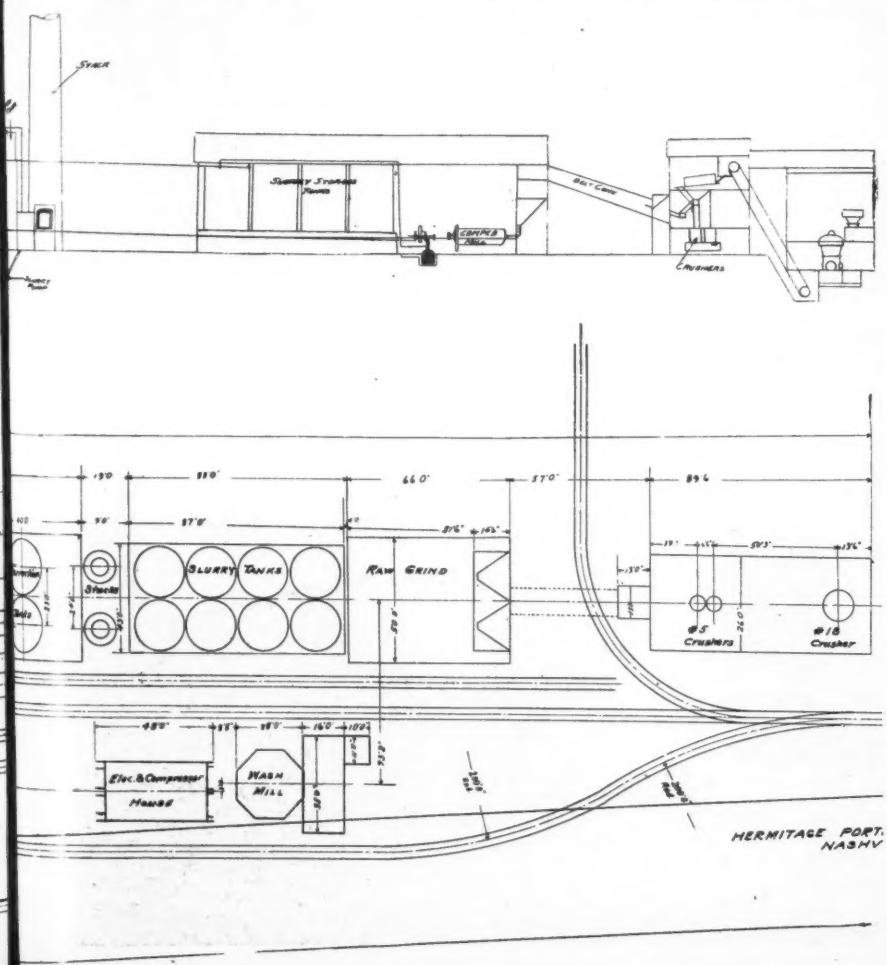
Stone rejected by the screen which



Plan View and Side Elev

selects the sizes to be sent ahead to the raw grinding plant is dropped to two No. 5 N Allis-Chalmers crushers which pass their product to a 20 inch belt conveyor, 54 feet between centers. This belt conveyor brings the stone back in the direction of the primary crusher and permits its discharge into the 42 inch pan conveyor which carries crushed stone from the primary crusher to the screen.

All stone for the raw grinding process goes to two compeb mills. These mills are fed by stone from tins supplied by the belt conveyor that is fed either from the screens or from the outside storage by the crane. At this point also the flow of stone into the compebs meets the supply of clay pumped from a clay sump located outside and below a 26 foot American wash mill. This wash mill, a concrete structure shown in one of the photographs, is located beside the raw grinding building. Clay from the pit is hauled to the wash mill in cars and dumped. The action of chains and bars driven through the clay with which water has been added, makes in this mill a substance of the proper consistency for pumping. The clay is run off from the washing mill into a sump and sent forward by a 3 inch centrifugal pump to the compeb mills. From this point on, the method of manufacturing cement is



nt, showing Flow of Materials

the typical "wet process." The finely divided material as it comes from the compeb mills drops to a slurry sump from where it is picked up and forwarded to the slurry storage tanks by a slurry pump. The pipe running from this pump is arranged to discharge into any of eight concrete slurry storage tanks with a total capacity of 7200 barrels. Water for the process is supplied by a Gould deep well pump.

While the slurry is in these tanks which are 20 feet in diameter and 30½ feet high, it is continually agitated by air and is at all times in proper condition for forwarding to the burning process.

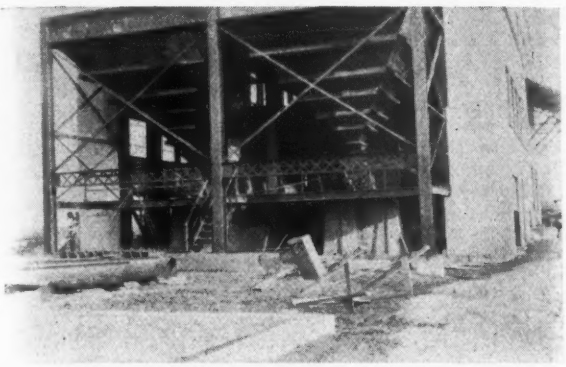
The compeb mills mentioned above are driven by 400 horsepower synchronous motors. Motors of this type are used at a number of other points in the plant and stabilize power requirements and consumption and make the operation electrically efficient. The slurry pump which forwards material from the sump to the storage tanks is an air operated device of 5 by 5 foot size. The duty imposed upon it is that of elevating the slurry to the tops of the tanks, which involves a lift of some 40 feet.

From the storage tanks the slurry flows by gravity through a pipe line to two correction tanks, each with a capacity of 450 barrels. In this tank, also, the slurry is agitated by air and to it are added the exact amounts of materials, necessary to bring it to the proper analysis for burning. These correction tanks are located below the feed ends of the kilns. Two 5 by 5 foot slurry pumps elevate from the correction tanks to two 50 barrel feed tanks, located directly above the feed ends of both the kilns. From the feed tank the slurry is sent forward to the kilns by Ferris wheel type slurry feeders. These feeders are operated at speeds determined by the speed of the kilns, for the feeder is arranged to drive from the kiln.

At the present time two kilns are installed. These are 150 feet in length and 10 feet in diameter and are, like all machinery directly used in the cement making process, products of the Allis-Chalmers Company. The kilns are lined with Lacledé-Christy brick manufactured by the Clay Products Company of St. Louis.

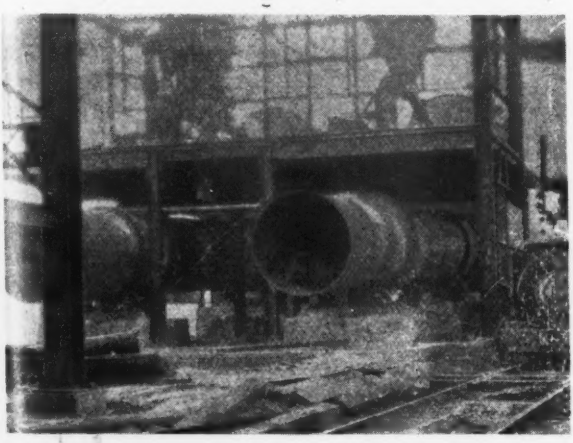
After its long trip through these kilns, the material that was pumped in as slurry is discharged as red hot clinker and dropped to 8 by 60 foot rotary coolers, one of which is located

Crusher and Raw Grind Buildings and Slurry Tanks



Clinker Hoppers at Finish Grind Plant

The Coal Pulverizing Plant is Not Yet Completed



The Rotary Coolers Discharge in an Open Clinker Pit

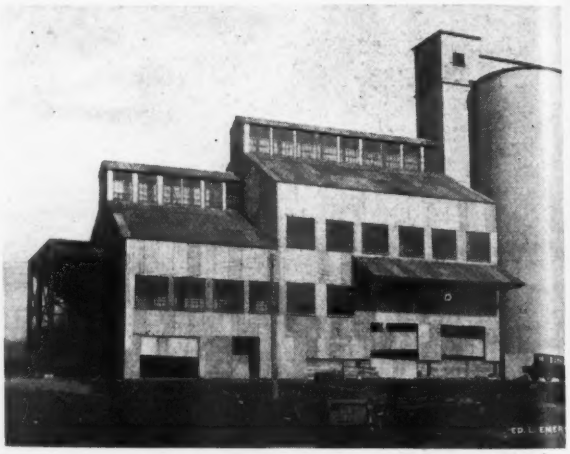
directly below each of the kilns. The cooled clinker from these machines is dropped to a clinker pit on the outside, remaining there until it is picked up by a Brownhoist locomotive crane with a 2-yard bucket.

The kilns are fired with pulverized coal from a coal pulverizing plant located to one side of the firing end of the kilns. This plant consists essentially of a 24 by 24 inch coal crusher, a 6 by 60 foot Ebro type rotary drier, a No. 622 compeb mill and a powdered coal storage bin. Liberal space is left for coal storage at the side of the coal pulverizing plant. These cranes pick up coal from storage and drop it in a hopper. From this hopper the lump coal goes to the crusher in which it is reduced to proper size for introduction into the rotary drier. Passing from the drier the coal is picked up by a 10 inch elevator, 35 feet between centers and sent to the hoppers of the compeb mills, dropping from these mills in a finely pulverized condition. It is then forwarded by a screw conveyor to the powdered coal storage bin. A 12 inch screw conveyor, 20 feet long, draws off coal from the bin and feeds it to a 12 inch screw conveyor, 38 feet long, at right angles to the conveyor from the storage coal bin from which it goes to the coal injector and through the firing hood into the kiln. A No. 4½ and a No. 10 exhauster are employed in the process. A 20 horsepower motor furnishes the power re-

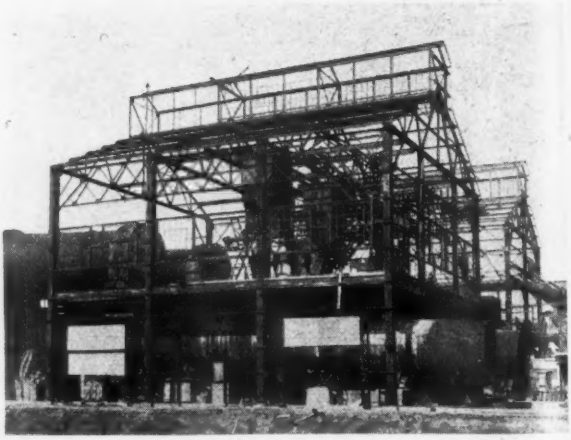
quired for introduction of the coal into the kiln.

After the coal has done its work in the kiln, the hot gases are taken off at the charging end and brought to two stacks 125 feet high and 7 feet in diameter. These stacks are of radial brick construction and were built by the Alphons Custodis Company of New York City who specialize in the erection of large brick stacks.

The Hermitage Company does not intend at the present time to install waste heat boilers but it is quite likely that this will be done at some time in the future and space has accordingly been left for this purpose. In the event that waste heat boilers are installed, they will be erected to one side of the plant itself. An 82 by 50 foot space was provided in the original plan between the slurry tanks and the stacks, but later thought on the subject brought about the decision to erect the waste heat boilers to the side of the plant.



Finish Grind and Packing Houses



The Coolers From the Side and Ends of Kilns

Clinker discharged in the concrete pit by the rotary cooler is reclaimed by one of the Brownhoist locomotive cranes equipped with a 2-yard bucket and discharged in the clinker bin at the end of the finished grinding plant. In handling this work, the crane will run on the same track that is used when coal is being transferred from the storage pile to the coal pulverizing plant. At one end of this track is the coal storage, already described. At the other end is the clinker storage. The room left for an extensive clinker storage is another feature that will tend to make for flexibility to plant operation.

Following through the flow of material as described up to this time, the reader will have noticed that liberal provision has been made for storage at four points. There is sufficient room left for a large crushed stone storage, an adequate provision for storing slurry in tanks and plenty of room for storing clinker and coal. Ordinary breakdowns at practically any point will not immediately affect production of the finished material. The clinker bins are arranged to feed two No. 722 compeb mills which grind the clinker and gypsum to the requisite fineness and pass finished cement to a 14 inch elevator 45 feet between centers. This elevator discharges into a 14 inch screw conveyor, 50 feet long. This, in turn, feeds a 14 inch elevator, 50 feet between centers,

from where the cement goes to another screw conveyor, 56 feet long. By this time it has reached the top of the cement storage bins. The last 14 inch screw conveyor mentioned runs between two pairs of bins and directly over a star shaped bin formed by the sides of the four round bins. These storage bins are each 24 feet in diameter and 70 feet in height. Together with the star shaped bins in the center, they have a total capacity of 37,750 barrels of finished cement.

Below the cement storage bins are three 14 inch screw conveyors each 48 feet long. The central conveyor in this set of three discharges is a 14 inch bucket elevator 48 feet between centers. The two outer screw conveyors from the storage bins are connected to this elevator by two 14 inch screw conveyors, 17 feet long. This last mentioned elevator, which can as described take cement from any of the bins, elevates its products to a 20 inch screw conveyor screen. From the screen, the screened cement goes through two three-tube Bates Packers, where the cement is packed and passed in bags to a 30 inch belt conveyor, 22 feet between centers, which carries the bags either to storage or to the shipping platform.

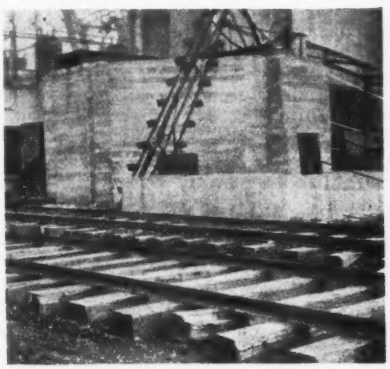
Above the baggers is the sack repair and the clean sack and storage floor. A No. 2 bag cleaner designed by the Allis-Chalmers Company is used for cleaning sacks that have come back. This device is rather larger than those usually employed in a mill of this size.

The plant throughout is very strongly constructed. The iron work has been built heavily. Corrugated zinc is used for siding and roofing and very substantially constructed buildings are the result. The entire plant from the end of the crusher building at which the material comes in to the end of the last cement storage bin is 763 feet long. The crusher building is 95 by 26 feet; the raw grinding building 66 by 50 feet; the slurry storage tanks 90 by 50 feet; the kiln building, combining firing and discharge ends and the stacks, is 215 by 50 feet; the finished grinding building is 50 by 50 feet; packing house, 45 by 50 feet; and the cement storage bins, 41 by 50 feet. The steel buildings were erected by the Nashville Brick Company. The design and construction of the slurry and cement storage tanks was handled by the Bland Engineering Company of Minneapolis, Minn.

The chain and belt elevators used throughout the plant were supplied by the Weller Manufacturing Company and the Chain Belt Company.

A very completely equipped laboratory is located to one side of the plant near the slurry storage and slurry correction tanks. The chemists are thus brought as closely as possible to their work which will, of course, to a quite considerable extent have to do with that part of the plant where proportioning and correction is accomplished.

Beside the laboratory is located the building through which electric power is distributed to various parts of the plant. Here are located all the transforming and power board apparatus. The transformers are located on the roof of this building, as may be seen



The American Wash Mill

from one of the accompanying illustrations. The electric power used in the plant is all purchased from a public utility company. It is received at 23,000 volts and stepped down to the voltages required by the various motors used in the plant. In this power distributing center are also located two Ingersoll-Rand compressors which supply all the air required in the plant for slurry agitation and other purposes.

In addition to the very comprehensive track system used at the plant for hauling of raw materials and for locomotive cranes, ample storage track is provided for empty and loaded cars. At the loading platform are installed Stephens-Adamson car pullers, which handle the work of

moving empty and loaded cars around the loading operation.

The new plant is being constructed under the supervision of a competent engineering force directed by Mr. William Fowden and Mr. D. F. Farrar. Mr. R. T. Miller, manager, maintains offices in Nashville at 174 Third street together with the T. L. Herbert Company, large aggregate producers in that city. The president of the concern is Mr. John C. Vance. Mr. T. L. Herbert, Jr., is vice-president and Mr. R. D. Herbert, secretary and treasurer. Mr. Fowden and Mr. Farrar have their offices at the plant.

"Sands and Crushed Rocks"

"Sands and Crushed Rocks," in two volumes, by Alfred B. Searle, (Oxford University Press, American Branch, New York, publishers), is a discussion of the many kinds of sands and crushed rock, their nature, properties and treatment.

Sand is described as one of the most abundant of substances, whose present and possible uses are multitudinous—far greater, in fact, than is realized. Yet the sands have been studied but little. Like the clays, sands have largely been neglected by the universities, and most users have had neither the training nor the facilities to investigate them extensively. This, says the author, is the more unfortunate as many of the sands are of great commercial importance. Says Mr. Searle:

"It is now being increasingly realized that this branch of natural science presents a very wide field which, if developed, will prove of untold value to the many industries connected with such materials.

"The purpose of the present volumes is to summarize in a convenient form such geological, chemical, and mineralogical information on sands as is likely to prove of value to those engaged in the digging, sale, and many uses of these materials, and special attention has been paid to the properties which are respectively desirable and harmful in sands used in various industries. It is hoped that, by this means, sellers may find suitable and possibly unexpected purchasers, and users may ascertain what to look for and what to avoid when ordering supplies of sand."

Japan to Spend $100,000,000 Here

Japan is to purchase in the United States, during a period of five years, building materials for the reconstruction of Tokio and Yokohama totalling $100,000,000 in value. These orders will not be placed directly by the government of Japan, but will be executed through Japanese firms having connections in this country, according to H. Tsushima, secretary to Finance Minister Mori.

Materials specified to be used, in general, are steel, lumber, cement, and other building materials. It is estimated that the money now available and which will accumulate to the Japanese government's credit in New York City, will total about $100,000,000 during the five year rebuilding period.

Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, Continental Trust Building, Washington, D. C., at the rate of 20c each. State number of patent and name of inventor when ordering.

1,481,273. Scraper-bucket. Harry A. Roe, Chicago, Ill., assignor to John A. Sauerman, same place.

1,481,336. Bucket. Phillip M. Armstrong, Hackensack, N. J., assignor to Hayward Co., New York, N. Y.

1,481,787. Operating mechanism for dump-cars. James D. Benbow, Aurora, Ill., assignor to Western Wheeled Scraper Co., same place.

1,481,788. Dump-car. James D. Benbow, Aurora, Ill., assignor to Western Wheeled Scraper Co., same place.

1,481,858. Gravel-loader. William H. Curl, Fair Play, Mo.

1,481,875. Mining system and apparatus. Edmund C. Morgan, New York, N. Y.

1,482,199. Mining-machine. Edmund C. Morgan, New York, N. Y.

1,482,310. Rock-drill. Joseph Lodato, Ogden, Utah.

1,483,053. Mining-machine. Roy Norman, St. Louis, Mo., assignor to Sullivan Machinery Co., Claremont, N. H.

The Application of Electricity in Crushing Stone

*By E. W. PILGRIM, General Electric Co.

Service is a commodity that manufacturers do not sell, but give away and the service most appreciated is the service rendered a prospect. To win a customer, you must always bear in mind that your prospect is in the market for straightforward, honest facts and to earn his confidence you must show him that his problem is being given careful study. You must solve the problem from his angle and to his best interests.

Electricity, by virtue of its flexibility of application and being a commodity found almost everywhere is acknowledged our greatest and most useful servant. We will, therefore, assume electricity as our source of power.

We must now choose what form is best suited for our application and I would recommend three phases, 60 cycle current because this current is practically standard in the United States and electrical manufacturers build motors of these characteristics on a quantity production basis. Therefore, they cost less and are carried in established warehouse stocks at leading centers to render quick service.

Voltage: Because the location of the machines in the quarry is changed as the work progresses, temporary power lines are required, often most conveniently laid among the ground and the work is mostly outdoors, grounds are liable to occur and a low voltage is essential. I would, therefore, choose 440 volts as most desirable voltage. Our choice of power then is 440 volts, 3 phase, 60 cycle. How shall we obtain it?

If there are Power Company lines running near the quarry site so that connections can be made at a moderate cost, purchased power will prove to be the most economical. Continuous operation is assured because the Power Company has standby or emergency units. You will find that the Power Company's rate can compete with any type of small isolated power plant except, perhaps, a water-power at or near the site that can be cheaply developed.

The Power Comany will deliver power at 2300 volts or higher voltage. We must now choose a site for a transformer substation. This location should be near our center of distribution, but out of range of flying stone from blasting, and its equipment will consist of:—

1—Galvanized steel tower supporting switches, bus bars, cables, etc.

High tension anchoring insulators for the incoming line

Air break disconnecting switches

Choke coils

High tension expulsion type fuses

Oxide film lightning arrester with disconnecting switch

Transformers

High and low voltage transformer connection busses

Switch house—consisting of a steel cabinet enclosing a switchboard panel, equipped with watthour meter, overload and no voltage relays and oil circuit breaker.

For the average quarry the transformers would each be 200 KVA capacity or less.

1—Separate lighting transformers of probably 10 KVA.

Lighting: Good illumination is Class A insurance against accidents. Incandescent lights should be so located that they will perfectly light the machinery, and also be placed where they may be renewed and cleaned conveniently. The switch for turning off the lights must be handy so that workmen will turn off lights when not needed. Sixty to 100 watt Mazda lamp should be used as not enough illumination can be had from smaller sizes after they once are coated with a film of dust. A number of flood lights illuminating the working part of the quarry should be installed, and so arranged that the light from them can be changed as the work of quarrying progresses.

The crushed stone industry in the average plant will have installed about 500-700 H.P. electric motors,

*Paper presented at National Crushed Stone Convention, St. Louis, January 22, 1924.

distributed in about twenty units, and as the ratio of the operating time to the total time is around 80—90 per cent, this makes a desirable load for a power company. The power company will probably have a rule limiting the size of squirrel cage motors to about 40 or 50 horsepower. Within this limit will fall the motors used for the quarry pump, rotary screens, grizzly's belt and bucket conveyors and machine shop motors. Squirrel cage type motors are the proper types for these machines. In selecting your motor it is to be remembered that large quantities of fine dust are flying about. Some of the motors are installed out of doors, and there is more or less vibration due to the nature of the work. General Electric motors, squirrel cage type, meet these requirements, having cast aluminum rotors or rotors with electrically welded end rings. Stator windings are treated so that they are moisture-resisting. Bearings are dust-proof. Bearings and shafts are large and rugged to withstand sudden strains.

Large dust-tight oil well covers are provided, which, when opened, give a clear view of the oil rings so that it can be readily observed if they are rotating properly.

Continuous conveyors are usually the most economical means of mechanically loading and unloading loose bulk material and for moving them short distances. By the term "continuous conveyor" is meant those types of machines which keep the material moving forward in a constant stream, or in separate amounts following each other so closely that this result is approximated. This class of machines may be divided into three groups, elevating only, elevating and conveying, and conveying only. Machines for elevating only are almost without exception of the bucket type. Machines for elevating and conveying are also ordinarily of the bucket type, either of the V type bucket or pivoted bucket carrier form. Machines for conveying only include belt conveyors, apron and pan conveyors, screw conveyors, etc. Where material is to be loaded from a storage pile to wagons, a portable conveyor may be used to advantage. If a conveyor is long or inclined, making it hard to start, a slip ring motor may be required. This type of motor has the rotor windings insulated and connected to collector rings and through brushes to a controller. They have high starting torque and do not pull excessive current from the line on starting. If on the inclined conveyors there is a dangerous element introduced by overhauling the motor in case of power failure, the motor should be furnished with a solenoid brake.

The crushers, jaw, rotary, gyratory and hammer type, will require the largest motor running up to 300 H.P. These machines require large starting torque under certain conditions, that is, starting up after machine has been clogged due perhaps to failure of power.

To meet the torque requirements and power company rules if an induction motor is to be applied to crushers, a slip ring type should be chosen. To relieve the motor from shocks and increase the life of bearings, the motor should be belted. With an all induction motor load the power factor of the plant would probably be around 70—70 per cent. This power factor will be undesirable to the power companies so that a synchronous motor should be installed somewhere to better the power factor. The General Electric Company's super-synchronous motor has all the characteristics required for a crusher application (high starting torque, high pull out torque, power factor correction, rugged design). The electrical construction and essential dimensions of this motor are identical with the standard synchronous motor of the same rating. The special mechanical features include the suspension of the stator so that it can rotate during the starting period. The periphery of the frame is machined for a braking surface and is fitted with a band brake, lever and quadrant of mine hoist practice.

The motor is a pedestal type machine with two pedestal bearings. Each pedestal carries a bearing which is modified so that the outer part forms the bearing for the rotor shaft, while the inner part carries the bearing for the stator; the stator being supported on a hollow journal fastened to an extension of the end shield.

When starting with load, the brake is released, the armature is energized and comes up to induction motor speed. The field (rotor) is then energized and the armature comes to synchronous speed and when in synchronism the motor will exert approx

imately 250 per cent torque before falling out of step and stopping. Now, by applying the brake the armature can be slowed down which results in the starting and speeding up of the field and attached load. The acceleration proceeds to synchronism proportionally as the armature is brought to rest, that is, the sum of the speed of stator and rotor always equals the synchronous speed of the motor. When brake is locked the unit has become a normal synchronous motor.

Throughout the acceleration of the field from zero to synchronism the motor is able to apply torque to the connected load several times greater than its normal full load torque.

The current drawn during starting bears the same relation to the full load current as the starting torque required bears to the full load torque. That is, a starting torque of 125 per cent full load torque will draw 125 per cent of full load current from the line.

Heretofore when synchronous motors have been connected to loads that could not be relieved during starting it has been necessary to interpose two extra bearings and a clutch of some sort that would allow the motor to come up to synchronous speed while disconnected. The cost of these extra fittings, their weight, the careful alignment required for a four-bearing set and the extra room taken up, have been serious handicaps working against the use of this otherwise very desirable type of motor.

The synchronous motor has two to three per cent better efficiency than an induction motor of the same rating, with the added advantage of being operated at say— .8 leading power factor as against .85 lagging power factor of the induction motor. This permits power factor correction and raises the power factor of the entire plant which is very desirable.

The next step is to electrify the machines in the quarry. First, we have the drills for blasting. These machines will be portable and an adjustable speed motor will be required since speed must be lowered as the depth of hole increases.

It will be found advantageous to have a portable air compressor to supply air for small drills used in breaking up the large mass of rock into sizes that can be handled by the crushers. At 10 or 15 H.P. squirrel cage motor would drive a compressor of sufficient size to handle four or five such drills.

For the ordinary quarry, it is usually desirable to take the stone either direct or after it has been shot, from the face and load it into mine cars with some form of power shovel. The advantages of electric drive over steam for this work are quite marked. Especially where the operation is intermittent and shut-downs of thirty minutes to one or two hours are liable to occur, the electric shovel is at a decided advantage on account of the fact that it can be shut down completely and will not use any power, whereas, the steam machine would have to stand with the fires banked and would be using fuel. An average quarry would want to load in the neighborhood of 800 cubic yards of rock in a ten-hour day. To do this against a fairly stiff bank would require a shovel with about a 1½ cubic yard bucket. A suitable shovel would be one of the full revolving type having a fairly high and wide reach, and fitted with a modern Caterpillar Traction, giving it a very wide range of operation. One of the big advantages of Caterpillar Traction is that the pit gang can be reduced to a minimum, thereby cutting the operating expense.

This type of shovel will work rapidly in comparatively hard digging and can load accurately into cars with minimum movements of the loading track. It can be equipped with various types of dippers and booms to suit special local conditions.

Power supply is brought up to the shovel by a flexible cable about 500 feet in length, which trails after the shovel as it moves. The equipment on the shovel will be as follows:

Hoist motor.
1-75 H.P., 230 V., 485 R.P.M., series wound mill type motor.

Swing motor.
1-20 H.P., 230 V., 725 R.P.M., series wound mill type motor.

Crowd motor.
1-20 H.P., 230 V., 725 R.P.M., series wound mill type motor with waste packed bearings.

Hoist control.
1 drum controller with vertical handle.
1 magnet valve.
1 protective panel.

Swing control.
1 drum controller with vertical handle.
Crowd control.
1 drum controller with vertical handle.
1 magnet valve.
1 protective panel.
1 combined register.
Motor generator set.
This set will consist—50 Kw., 1200 R.P.M., 250 V., S.W., generator, direct connected to 75 H.P., 1200 R.P.M., 440 V., motor, forming a 2-unit, 3-bearing set with base. Motor equipped with and play limiting device.
For controlling motor generator set
1 starting compensator.
1 disconnecting switch.
1 generator field rheostat.

The functions of the hoist, swing, and crowd motors and controllers are evident. The magnet valves listed are used to control the mechanical brakes on the various motors. Tests have proved that air brakes are superior to electric brakes for this service. The protective panels on the hoist and crowd motions furnish an automatic form of protection to prevent burning out the motor when stalling conditions are encountered. The function of the motor-generator set is to convert the alternating current power brought to the shovel into direct current, which it has been found is the most suitable form for operating the motors which are geared directly to the various motions.

Tests show the following comparative results on cost of operating shovels.

Steam	100%
Gasoline electric	86%
Electric	76%

Stone can be hauled from the quarry to crushers by storage battery locomotives. These locomotives are equipped with long life batteries, and are highly efficient. One of the big items of expense in each ton of stone is the haulage charge. The storage battery locomotive reduces this expense by their ease of operation and low center of gravity, which allows maximum speed on tracks that are often uneven.

The storage battery locomotive makes grade and hauls heavy loads easily. They are provided with batteries, the upkeep and repair cost of which is extremely low. There is always extra power when necessary to couple on an extra car.

For spotting cars the General Electric Company manufactures an electric winch as a complete self-contained unit, having all gears, motor, controller and resistance enclosed in the winch base, the unit is compact and especially adapted to out-of-door service.

When visiting crushed stone plants you will, no doubt, observe that the motor equipment is not exactly as described above, perhaps only part of the machinery is electrified. Each plant requires specific treatment and modifications must be made, not always the best, but to meet local conditions. I have endeavored to place before you a target to shoot at—hit the bull's eye if you can.

Atlas Plans New Bag Mill

A large bag manufacturing plant will be established at Leeds, Ala., by the Atlas Portland Cement Co., it is reported. While details of size or capacity of the new factory, or the number of persons to be employed, have not as yet been worked out, it is understood that the output will be sufficient to take care of the needs of southern and western plants of the Atlas company, which operates nine cement mills in the United States. The company at present has a bag factory at Northampton, Pa., for the manufacture of its own bags, but this plant is insufficient to supply the demand.

The new plant is also provided with with a tunnel stock pile with storage capacity of 1,200 yards of sand and rock in addition to the regular bunker capacity. All raw material is taken out with a drag line hoist and carrier of latest design. The plant cost approximately $30,000.

It is expected there will be more than 500 members of the National Association of Cement Dealers in attendance at the annual convention which will be held at the Biltmore in Los Angeles May 21 to 24.

Fire of unknown origin recently destroyed the plant of the Midwest Crushed Stone Quarries Company in the edge of Greencastle, Ind., loss is probably $50,000. The plant was one of the largest stone crushing concerns in the Middle West.

Careful Planning Necessary in Stock Pile Building

Various Systems are Briefly Outlined to Show How Important it is to Investigate Every Method of Handling Material Before Purchasing the Equipment

By D. J. HAUER

SEVERAL years ago, at the request of some of our readers, a number of articles were written on the subject of the storage of sand, gravel and stone, and rehandling for shipment. The desire of those who requested this information was for a storage system involving a large tonnage and to be handled by belt conveyors.

The system outlined at that time could be used in connection with the ordinary storage bins employing the conveyors to store excess production, or the ordinary bins could be eliminated and all the product handled by the conveyor from the screen direct into storage piles, and rehandled by other conveyors for shipment. The storage and rehandling system then outlined were rather elaborate, and since that time the writer has had several requests for economical methods of storing and rehandling for use on smaller operations.

It is possible to give a number of rehandling systems, but strange to say there are on the market a number of machines that will take materials from a storage pile and load them into a truck or car economically, yet there are not a large number of devices or methods for making storage piles economically.

Should Consider Storage Piles

One mistake frequently made in building plants is not to take into consideration the storage of excess materials. There is seldom room under the screens to install devices, such as conveyors, to carry the product to outside storage piles, nor are bins so arranged as to take materials from them except by the ordinary methods—that is, with gates and floors arranged to form outside storage piles from the bins. These matters should be given consideration in building the plant, for there frequently comes periods during which shipment, for some reason, cannot be made, and yet it is desired to continue production.

Lacking the proper facilities for handling products directly from the screens to outside storage piles makes it necessary to either rehandle materials from the bins to temporary piles or else to install special devices for this work. When the material must be handled through the bins into vehicles and be hauled away to storage piles the cost is always fairly large, being equal at least to a regular delivery where the haul would not exceed half a mile.

For most products there is an added cost of making separate piles for each size of material, thus if stone or gravel is being produced in three different sizes there must be three stock piles. If cars are run under the bins and the materials hauled away in these vehicles, then three sets of tracks must be laid to make these piles. These facts show the need of making stock piles in such a manner as to save this cost.

In some cases operators are much hampered in making stock piles by not having available room in the immediate vicinty of their plant. In such cases it is absolutely necessary to haul the material some distance from the plant in order to store it; but if there is room adjoining the bins money can be saved by storing in such places where either chutes or conveyors can be used.

From Bins to Storage

In many cases bins are now built so as to be emptied by vehicles passing directly under them. When this style of bin is used it is often possible to make the storage pile on either side of the bins. This can be done in two ways: Side doors can be put on the bins and the materials run into the piles through these side doors, but the limit of the pile would depend upon the height of the door and the bin.

Much larger stock piles can be made alongside of the bin by placing temporary chutes under the screens and running the material directly into the storage piles. This method allows the bins to be kept full and a much larger storage pile can be made without rehandling the material. This method of chuting materials direct into a storage pile is the cheapest that can be devised.

The next cheapest is by means of belt conveyors. It depends upon the size of the conveyor system to be installed as to the initial cost, but after once installed it is operated cheaply. Description of such systems have already been given in PIT AND QUARRY.

Although it is not possible by means of chutes to have such an elaborate system of storage as it is with belt conveyors, yet by means of chutes and derricks material can be stored cheaply and on an elaborate scale. By means of chutes the materials can be run into piles on the ground or into specially built pockets. A derrick with a boom from 60 to 100 feet long can be set up within reach of these piles or pockets, and with a grab bucket materials can be picked up and put into a large pile by the derrick.

With a derrick of the kind described a large area can be covered, so that a number of good size piles can be made. One advantage of using a derrick and grab bucket for storing is that when the time comes to sell these materials the same machinery can be used to rehandle the materials, for vehicles can be loaded from the various stock piles.

Portable Conveyors Versatile

Another method of making stock piles is by means of portable chutes, when these are already owned by the operator. These are simply belt conveyors that can be moved from place to place. The material can be dropped from bins onto such conveyors at night and other times when the bins are not being used for direct loading for shipment. The stone can also be chuted from under the screens into small pockets on the side of the bin and from these pockets fed onto the portable conveyor.

Two or three of these conveyors can be used in a line, one feeding onto another, thus the material can be carried some distance from the bin. In one case the writer did this in the following manner: He first put one conveyor at work and made a fair-sized pile of stone. This was leveled off and the second conveyor raised to the top of this pile and placed in position to carry the material further.

The second pile was made with thi conveyor considerably higher than t pile it sat upon. On the second pi after it was leveled off a third co veyor was placed and a third pile wa built up to the height of the conveyo Then by swinging this conveyor i a circle, a larger pile was made. It was also possible to swing the othe two conveyors in this way and mak much larger piles. This is a chea method of building stock piles if th conveyors are at hand to use.

Stock Piles Built with Cars

Many stock piles are built with cars. In building these, tracks must be run out on top of the piles and it is necessary to shovel stone away from the track on each side as the cars are dumped. Then, too, the track at the end of the pile must be cribbed up in some way with temporary timbers in order to lengthen the pile, and naturally these timbers are covered up with stone and are only reclaimed when the material is rehandled for shipment. These timbers impede the work of rehandling the material. However, storage piles may be made in this way.

If storage piles are to be made with cars season after season, money can be saved by building a trestle work from which the cars can be dumped. The cost of making storage and rehandling materials becomes less and the work is carried on much quicker. It is also possible to store several different sizes of material under the same track and trestle and keep them separated, which is not possible when a trestle is not used, for without a trestle there must be a track and separate pile for each size of material. It is true that with a trestle it is difficult to use a derrick and grab bucket for rehandling the material, but there are many other means o loading the materials when the time comes to ship them.

Use of Wagons and Trucks

Due to the trouble in building stor age piles with cars, those operator who still use dump wagons for hau ing spoil and other materials, use dump wagons for building stock piles The method used is very simple. The

wagon is driven on top of the pile and dumps on the edge going down over the end of the pile to the ground, just as dirt is dumped on a waste pile. The limit of the height of such a pile is the slope that an empty wagon with its horses can come down.

Another method of building stock piles is by means of auto trucks. The truck travels on top of the pile and dumps the material over the edge. If the pile is made narrow it is necessary to back the truck out on the pile, but as a rule the pile is made wide enough for the truck to make a turn on top of it. This method is much cheaper than by wagon and is generally more satisfactory than building stock piles with cars, except where trestles are used.

Bauxite Production Equals High Record

About 500,000 long tons of bauxite was produced in the United States in 1923, according to estimates given out by the Department of the Interior through the Geological Survey. This quantity is equal to the largest annual domestic production before the world war. The largest producer was the American Bauxite Co., whose plant at Bauxite, Ark., is said to have handled about 1,000 tons a day. Three other companies also mined bauxite in Pulaski and Saline counties, Ark.

The operations in the eastern fields were less extensive, as the older deposits there are worked out. About eight companies, however, were working deposits in Alabama, Georgia, and Tennessee, and the output was probably not much less than in 1922, when 42,810 long tons were produced. New deposits like those worked in Macon, Sumter and Wilkinson counties, in central Georgia, were opened in 1923 in east-central Alabama.

Fifty years ago the annual production of cement in this country was 9,000 barrels. Thirty years ago production had increased to more than 500,000 barrels. In 1902 it was 17,230,000 barrels, and the next 20 years brought output to 117,000,000 barrels. The production for 1923 was 137,177,000 barrels. Exports of cement in the last quarter of 1923 increased 731 per cent.

Use of Gunite in Coal Mines Increasing

RAPIDLY increasing use of ejected cement in the underground portions of coal mines arouses curiosity as to what are the kinds of work in which the application of gunite seems so necessary. Inspection of various mines in which gunite has been used extensively discloses many unique and advantageous uses of sprayed concrete, among which are some instances where it is actually being substituted for reinforced or monolithic concrete, especially in the case of shaft and slope lining.

Probably the most important use of gunite is in sealing off gas in abandoned workings. Of the many types of stoppings constructed with the use of this material, perhaps the most common one is a pack wall of slate or sandstone laid without mortar and sealed by shooting it with gunite on one of its exposed faces. The outer edges must be carefully handled, and they are made airtight by extending the coating material beyond the points of contact by shooting the liquid mass over the ribs and roof.

Underground ditches are now commonly lined with gunite, just as they are above ground, as it has been found that they reduce the resistance to flow and are more easily cleaned than when not so treated.

Shafts with self-supporting formations are sometimes lined with gunite instead of concrete wherever the water problem is not serious. Sumps are lined with gunite, overcasts are sealed where leaks develop, concrete linings of shafts are repaired with gunite, walls are resurfaced and the material is used extensively in fireproofing small supply rooms, motor barns, pumprooms and other underground structures. There are various other uses of the material.

The Grove Stone and Sand Company was organized at Swannanoa, N. C., with capital stock of $200,000.

A huge rock crushing plant is in prospect for Upland, Calif., to be erected by the Standard Rock Crushing & Gravel Co., say reports. The plant will be capable of putting out from 2,000 to 6,000 tons of crushed rock every day, and will cost about $300,000.

Cement Field Keenly Active

Improvement and Expansion Is Reported

FAVORABLE conditions follow cement manufacture in the Lehigh Valley section of Pennsylvania. The various mills are maintaining active production and where curtailment has come about during the past month, it is only because of absolute necessity for making necessary repairs and improvements to machinery and equipment for the spring run.

Probably no other winter has shown such keenness with respect to demand and supply. Throughout the winter months business has been good, as recorded in PIT AND QUARRY, and now with a decidedly active construction period only a few weeks off, the call is growing more insistent. Some mills are taking business that will insure maximum capacity for several months to come, while others are booking orders from day to day which warrant the impression that continuous operations will prevail indefinitely.

With heavy production, there are correspondingly heavy shipments, with little opportunity to stock up. During January the distribution from the Lehigh Valley district was approximately 1,000 cars more than in the same month last year. The railroads have the situation well in hand, and are being well supplemented by motor trucks, which have been used to excellent advantage, due to the open winter. The February output and shipments are paralleling those of the preceding month, and will doubtless result in interesting high figures for both phases of operation.

It is predicted in certain quarters that the spring construction season will show a little shortage in material, at least during the opening weeks, as the aspects carry the impression that an unusually heavy volume of work will go forward. Particularly is this true in road construction, and is probably the reason why prominent contracting interests are commencing to stock up cement on their own account. Unquestionably, there are going to be periods of delay when the season is on full blast.

Labor, fuel and contingent features of operation hardly need mention. They, like other things, are indicative of a prosperous year ahead. There are plenty of men available according to employment records in the district. A large tonnage of coal is stocked at the different mills, and to all accounts, an equally large tonnage is available upon demand. The mill base in the Lehigh Valley district is well established at $1.95, in carload lots, per barrel, without bags.

The Lehigh Portland Cement Co., Allentown, Pa., continues on the active list with its various mills and looks forward to a good season. It is expected to maintain close to the present schedule. The company recently held its annual meeting, with salesmen and company representatives present from all parts of the country commemorating the company's twenty-fifth anniversary. Page space was taken in daily papers in various parts of the country, and on January 31, an announcement appeared with the caption, "At the End of Twenty-Five Years," and this brief but impressive comment: "Lehigh—the National Cement. Not the oldest, but the largest in the world, with widest distribution; unequalled service facilities; largest storage capacity; original ownership; 16 mills from coast to coast; uniform quality everywhere." These newspaper pages were also mailed out to the customers and prospective customers of the company. At the annual meeting of officers, there was a general re-election of all those so prominently identified with the organization, including General H. C. Trexler and Colonel Edward M. Young, both of Allentown; George K. Mosser, John D. Ormrod and Daniel E. Ritter.

The Giant Portland Cement Co., Egypt, Pa., has closed down its local central mill for about five or six weeks, dating from February 1, for repairs and betterments. The plant started last fall. It is expected to place the unit on the active list at the earliest possible date. Other mills of the company will continue to operate on regular schedule, with full working forces. During the past year, the company expended $245,374 for operations at its plants, maintaining the usual standard of efficiency. During this time, a new machine shop was constructed, a water-softening plant installed, and work commenced on a new stone drier and bridge crane for the clinker storage, all at the Reli-

ance mill. New records of production were established in the 1923 runs, and an equally favorable outlook is held for the present year. At the close of last year, December 31, the profit and loss surplus of the company stood at $499,257, as compared with $464,234 the year previous.

The Penn-Allen Portland Cement Co., Allentown, Pa., is active at its mills, and large shipments have been leaving the plant. A regular working force is on the pay roll. Exceptionally good business is expected in the coming months, insuring full operations for an indefinite period. The company has a fine local distribution, in addition to its other eastern trade, and the material was shown to excellent advantage at the recent building show at Allentown February 11-16, the first to be held in this city.

Other large producers in this section which are maintaining regular operations are the Atlas Portland Cement Co., with its large mills at Northampton; the Alpha Portland Cement Co., Easton and Martins Creek; the Lawrence Portland Cement Co., Northampton; the Whitehall Cement Mfg. Co., Cementon; and the Coplay Cement Mfg. Co., Coplay.

The Edison Portland Cement Co., New Village, N. J., is said to be booking fine business for the coming months, and the local mill is holding to good production, with normal working force. Effective March 1, Charles Edison, son of Thomas A. Edison, will become president of the company, as well as other of the Edison interests, succeeding Stephen B. Mambert, South Orange, N. J., who has acted in this capacity for a number of years past.

The Signal Mountain Portland Cement Co., James Building, Chattanooga, Tenn., has tentative plans for the construction of additional units at its plant at Signal Mountain, Tenn. The proposed expansion will consist of a number of buildings, estimated to cost close to $400,000, including machinery. The company has been maintaining active production at the local plant, and has heavy orders for the months ahead, insuring maximum output. The possibilities for appreciably larger sales have prompted the proposed plant extensions.

The Security Cement & Lime Co., Baltimore, Md., with headquarters at Hagerstown, Md., has recently increased its capital from $800,000 to $1,200,000, disbursing the additional stock among the stockholders in the form of a 50 per cent stock dividend. The company has enjoyed an exceptionally prosperous year at its mills at Security, Md., which were enlarged a number of months ago. The production and sales have justified an 18 per cent cash dividend to stockholders, in addition to the stock dividend, as compared with a 6 per cent dividend in 1922. Large orders have been booked, it is stated, for the early months of this year, and it is expected that the record of the preceding year will be paralleled closely during 1924.

The Cement Securities Co., Denver, Colo., headed by C. Boettcher, is reported to be negotiating for the purchase of the plant of the Monarch Cement Co., at Humboldt, Kan. The new owner proposes to improve the mill and will probably enlarge a number of departments. It will be placed on an active production schedule as soon as purchased. The purchasing company is also planning other expansion in the line of cement production.

The Wolverine Portland Cement Co., Coldwater, Mich., is operating at maximum at its local mills, as well as at the branch plant at Quincy, Mich., giving employment to the regular working force. The company reports a record demand for material and has tentative plans for advancing the output in a number of departments. During the past year, a total of 650,000 barrels was manufactured, and the present twelve months will see an equal, if not larger, production.

The Bruns Hydrated Lime Co., was organized at Toledo, O., by J. W. Bruns, of Woodville; R. L. Siegenthaler, of Fremont; W. H. Young, A. W. Shields and M. C. Matherson of Toledo. Capital stock $450,000. The company has 135 acres of stone land south of Woodville.

The American Salt & Chemical Co. has been organized by Los Angeles business men, for the purpose of building a large salt, gypsum and chemical mill near Ludlow, to represent an investment of about $2,000,000. Officials are: Harry D. Standley, William M. Morse, Jr., Mendell S. Mills, T. W. Hindmarsh and Harry K. Sargent.

January Breaks All Records

Construction Increased. Big Road Program. Market Firm

By Our Eastern Correspondent

EACH succeeding week holds brighter prospects for the sand, gravel and crushed stone markets in the eastern districts, and it is not to be questioned that there is a big season looming ahead.

The continuance of fine, open winter weather has given producers opportunity to do more than rest on their oars, for it has permitted current activities in all lines,—production, sales and distribution. Building supply companies have not been slow in placing orders for immediate requirements, which reflects the state of local trade. Sand, gravel, cement and lime, as well as related products have been in demand.

According to official figures, the month of January has broken all records for winter construction, showing the largest volume of work ever recorded, an advance of about 23 per cent over the corresponding period of a year ago, and of approximately 1 per cent over December, 1923. February and March look fair to duplicate this record, while the months to follow show no mean expanse of work, if architects' and engineers' boards are a reliable basis of prophecy.

Road construction is not only a matter of the immediate future, but one of present concern, for contracts are going forward now for large tonnages of crushed stone and cement for this character of work. Practically every state in the east is commencing to make known its requirements, giving no mean impetus to the production end. Pennsylvania, alone, is arranging a three-year road construction program to include approximately 2,500 to 2,600 miles of new highway. During 1924, it is proposed to place contracts for about 800 miles of improved roads, and a large fund is being provided to carry out the work.

There is nothing to report of material interest in connection with labor. The situation is quite satisfactory, if absence of agitation and discussion can be taken as gudes in this connection. There is no attempting to raise or to lower the prevailing schedules, and they seem quite well established. The prospects indicate that there will be no lack of work when spring arrives, unless something unforeseen happens.

The market continues firm and there is rigid stability in price levels. The general inclination, if such is at all perceptible, is an upward trend, which likely will become pronounced about the close of March. Some producers have no hesitancy in saying that higher schedules will be established, and this has already occurred in crushed stone.

This last noted commodity, crushed stone, is now priced at $1.75 a cubic yard, wholesale, in cargo lots in the New York market, as against a previous rate of $1.65, prevailing for some months past; this is for 1½-in. stock. In the case of ¾-in. material, a similar advance has ensued, making a figure of $1.85 as compared with a $1.75 quotation, as heretofore. The new prices are expected to hold well into the spring season, if not well beyond that time. Local dealers have not made any change in their figures of $3.25 a cubic yard, both sizes, delivered.

Good grade sand is priced at $1.25 a cubic yard in carload and barge lots, in the wholesale market, and is operating under an encouraging call. Dealers are charging consumers $2.50 for the material, delivered to building site. Fine white sand continues at its $5.00 level, retail.

In the line of best washed gravel, the rate maintains at $2.00 a cubic yard, wholesale to contractors and dealers, both 1½ and ¾-in. sizes, cargo lots. This is the same figure that prevailed a year ago, and in all likelihood will stand for spring business. Dealers are receiving $3.50 for the stock, Manhattan and Bronx deliveries, and a slight advance for longer hauls. There is a fair current call for this time of year and a healthy outlook.

Portland cement is enjoying good distribution, both in wholesale and retail circles, with prices showing no variation from those established a few months ago. The lowest figure to contractors and dealers for alongside dock delivery is $2.15 a barrel, without bags. Delivered by motor truck or otherwise to yard or building site, the quotation is around $2.50. New York dealers maintain to a $3.00 retail level, with customary bag rebate.

On the New Jersey waterfront, that is, Jersey City, Hoboken and vicinity, a wholesale quotation of $2.35 holds.

The Manchester Marble Co., P. R. Eaton, general manager, Dorset, Vt., will commence the immediate construction of a new one-story mill on local site, to cost about $50,000. The installation will consist of cutting, grinding, polishing and other machinery, for which it is understood that a number of contracts have been awarded. There will also be considerable auxiliary equipment. Local offices of the company are at 117 West Street.

The Albany Crushed Stone Corporation, Albany, N. Y., has arranged for an increase in capital from $200,000 to $400,000, for expansion in operations.

Frederick Bond, Pekin, N. Y., heretofore superintendent at the local stone quarry of the Bethlehem Steel Corporation, has purchased the property from the company, including 400 acres of land, which recently discontinued operations there. The equipment of the former owner has been removed. Mr. Bond is organizing a new company and installation machinery.

The Black Diamond Granite Corporation, New York, care of L. C. Burdett, Woolworth Building, attorney and representative, has been organized under state laws with a capital of $25,000, and 750 shares of common stock, no par value. The company is headed by W. H. J. Reynolds and A. R. Lindman. Plans are under way for the operation of granite, as well as other stone properties.

The Goodwin, Gallagher Sand & Gravel Co., Port Washington, L. I., New York, is maintaining active operations at its local properties, with employment of regular working force. The company has been adding to its equipment, and has ordered from the Magor Car Corporation, New York, 12 all-steel 30-ton hopper cars.

Richard A. Scanlon, president of the Lenox Sand & Gravel Co., 157th Street and the Hudson River, New York, well known in local circles, died of heart disease at his residence at Pelham Manor, N. Y., on January 19, age 44 years.

W. H. Gill & Sons, Inc., Brooklyn, N. Y., care of Henry Hetkin, 32 Court Street, Brooklyn, attorney and representative, has been formed with a capital of $10,000, to operate in bluestone and lime. The company is headed by W. H., C., and W. N. Gill.

The New Jersey State Legislature, Trenton, is considering a bill covering the purchase of crushed stone by weight only. The measure has found acceptance on the part of different interests in the state industry, and likewise, opposition on behalf of others. In connection with the latter, it is maintained that the weighing of crushed stone would be impracticable in small communities which are located at a considerable distance from quarries, and the carting, it is argued, would cost the municipality or purchaser more than any possible loss which might occur from an overcharge on the basis of the cubic yard, as heretofore used. The State Department of Weights and Measures is active in support of the bill, and is urging its adoption.

Stickler & Hinkle, operating stone quarries near Marietta, Pa., are maintaining heavy activities for this time of year, with regular working force. Plans are also progressing for large production in early spring, and considerable blasting has been done recently.

The Christiana Sand Company has been incorporated at Wilmington, Del., to own and operate sand and gravel pits. Capital stock $100,000. Incorporators are: Charles B. Bishop, E. H. Feustel, R. H. Ochletree, Wilmington, Del. (Delaware Charter Co.)

The new electric driven rock crushing plant of the National Rock and Gravel Company, Inc. began operation recently west of Lankershin, Calif. The plant has a 150 horsepower line operating a large crusher and washing screen, giving a capacity of 400 tons of material per eight-hour shift.

Articles of association were filed yesterday by the J. P. Corskie Company, Inc., of Barre, Vt., for the purpose of quarrying, selling, and manufacturing all forms of granite, marble and other stones, of buying or leasing real estate, quarries, and stone manufacturing plants and disposing of same; and developing and operating quarries, etc. Capital stock is $50,000, divided into 500 shares, value $100 each. Incorporators are: Charles P. Reynolds of Toledo, William S. Smith and James A. Webster of Barre.

Work Every Favorable Day

Producers Repairing Equipment for the Spring Season. Prices Steady.

By Our Pittsburgh Correspondent

WITH the winter season on in full blast and rivers quite filled with floating ice, it is natural that there would be a slight recession in the production of sand and gravel in the Pittsburgh, Pa., district. Still every favorable day is a working day to the producers in this section, and there has been a fair rate of output in the past few weeks. Also, the opportunity is being taken to make necessary repairs to river diggers and other craft, soon to be placed into service.

There is little to report in regard to market and prices. There is a healthy tone to the existing call for stock, and the prospects for heavy spring trade, both in production and sales, are decidedly good. It is expected that in the early weeks of the seasonal weather an unusually large tonnage will be distributed. At the present time, stocks are being absorbed in a number of instances for current account, to be replenished at the earliest possible date.

Washed gravel continues on a basis of $2.00 a cubic yard delivered on the waterfront, while f. o. b. barge, a figure of $1.60 prevails. Present stocks are sufficient for current business, with supply dealers quite active in call for construction and other purposes. These yards are asking $2.40 and $2.50 for the material delivered, according to haul.

River sand is in fair demand around $1.50 a ton in the wholesale market at Pittsburgh, and there has been no little distribution in recent weeks, particularly on call from the material dealers for local operations. The stock is bringing $2.40 a ton, retail, with higher quotation if at great distance from the yard.

Portland cement holds at $2.19 per barrel, wholesale, to contractors and dealers, less bags, with retail level at $3.20, and established bag rebate of 10 cents each. Crushed stone shows no change in a $2.85 per cubic yard figure wholesale, in carload lots.

To show the extent of sand and gravel production in the Pittsburgh district, it is interesting to note a recent statement of Major E. L. Daley, district engineer, who estimates that during the past 13 years a total of 44 million cubic yards have been taken from the Allegheny, Monongahela and Ohio Rivers. This, it is stated, would equal a lake five miles long, one mile wide and ten feet deep, large enough to hold one billion cubic feet of water.

Pittsburgh interests were well represented at the recent National Sand & Gravel Association convention at the Chase Hotel, St. Louis, Mo., of which a complete report appeared in the last issue of PIT AND QUARRY. A. W. Dann of the Keystone Sand & Gravel Co., national president during the past year, headed the list from this district. Among the others were Harry S. Davison of J. K. Davison & Brothers, and Joseph McGraw of the Ohio River Sand Co. All of the delegates recently returned to the city.

J. K. Davison & Brothers have completed repairs to their electric dredge, "Allegheny," and the digger has again been placed in service. The "National" and "J. K. Davison," of the company's fleet have been active in the vicinity of Aspinwall, while fair tonnage of sand and gravel has been hauled to the local market. The steamer, "Elizabeth Smith," has been active in the latter trade. The company is planning for an active spring season, and well in advance of that time expects to have all primary repair work on the different vessels of its fleet completed.

Captain William B. Rodgers, Jr., of the Rodgers Sand Co., left the city early in February for a trip to Bermuda, to be absent about three weeks. It is a pleasure and vacation trip only. A new hull is being put on the company's dummy sand digger, "Flora." The steamer, "Rebecca," is also laid up for repairs, being practically rebuilt at the Elizabeth marine ways.

Reports from nearly a thousand cities and towns to the Indiana Limestone Quarrymen's association show that winter building construction is going steadily forward. The winter construction industry is generally declared to be a success from an economic viewpoint and it has gone far in eliminating seasonal unemployment.

Says Dynamite's Action Is Misinterpreted

Common Belief That Explosive Expends Most of Force Downward is Error

GENERAL supposition is that dynamite acts downward and black powder upward, but this is apparently disproved by tests conducted by the U. S. Bureau of Mines at Pittsburgh, Pa. J. E. Crawshaw, explosives engineer of the government bureau, writes that dynamite exerts its force equally in all directions, and that tests proving this statement are simply and easily made.

In the case of dynamite being exploded on top of a rock, resulting in the shattering of the rock into many pieces, he points out that consideration is not usually given to the force expended on the surrounding air which, he declares, is equal to that which broke up the rock.

In support of his statement he referred to the test conducted by Dr. Charles E. Munroe, in which discs of guncotton were placed against plates of iron and steel. The holes made by the explosion of the guncotton were of the same size, regardless of whether the disc of guncotton was placed above or below the metal plate.

A later test made by Dr. Walter O. Snelling was also cited, in which the measuring of the forces was accomplished by the compression produced in small lead blocks. In each trial the explosive and lead block were held rigidly in position. In the first two tests with each kind of explosive the charge was placed above the lead block, while in the other two tests the charge was placed below the lead block, so that the downward and upward pressures were measured, respectively. A measurement of the four blocks used showed equal compression in each instance.

"In the practical use of explosives, however," said Mr. Crawshaw, "this force, which is applied equally in all directions, acts against unequal resistances and the effect obtained in any one direction can be equal only to the resultant of the resistances which act in the opposite direction. As soon as the confined gas is released, the force no longer acts. It is evident, therefore, that when the explosive is not exposed on all sides to an equal resistance the results of blasting may be such as to cause a ready misinterpretation of the real action of the explosive."

Has Faith in Under Water Coal Storage

In apparent disregard of the ponderous articles in the engineering press and other technical papers, the Ohio Power Co., Zanesville, Ohio, is contemplating building a mammoth coal bin in which the coal will be stored under water. This bin is to be 30 feet deep and a mile and one-quarter long. An old canal, built by the state, is now being dredged for this purpose. The company recently suffered the loss of $90,000 worth of coal which was fired by spontaneous combustion.

In direct opposition to the advocates of open-air storage, a prominent engineer has written: "While there may not be increase of efficiency by virtue of sub-aqueous storage, it has been abundantly proved that coal so stored does not suffer the deterioration that takes place when stored in piles on the surface. Just so long as oxygen can have access to coal the oxidation of the coal must and does follow. Every molecule in the coal that is oxidized is just that much heating value lost."

The Mather Stone Co. of Clear Creek, Indiana, recently increased its capital from $100,000 to $210,000.

Lassig Limestone Quarry Corp., Austin, Texas, has increased its capital stock from $25,000 to $60,000.

The Coast Rock Co., San Francisco, Calif., recently purcashed 160 acres and is preparing to build a plant which, it is said, will cost about $1,000,000.

The Armstrong Sherrod Sand Co., of Knoxville, Tenn., was organized recently with capital stock of $5,000. Incorporators are: Hugh E. Armstrong, W. H. Sherrod, M. M. Thomas, John Holl and S. O. Houston.

Federal Aid Roads

Lee Highway Association Urges Increasing Amount Available to $90,000,000

By Our Washington Correspondent

Early action by Congress in extending Federal aid on a larger scale to state road-building projects is urged in a resolution adopted at the closing session of the Lee Highway Association, held here recently. The Association is in favor of increasing the present amount of money available for road construction from $75,000,000 to $90,000,000 for the fiscal year beginning July 1, and $100,000,000 a year thereafter for three years, with $10,000,000 a year for national forest roads, as provided in the Dowell bill now pending in Congress. Former Representative Edward Howard, of Nebraska, advocated that the government take over both the Lee and Lincoln Highways and complete the development of these traffic arteries as national memorials to the two outstanding figures of war between the States.

The agriculture appropriation bill, recently reported to the House, cut off $14,600,000 of the Federal Road construction fund. In explaining the highway appropriation reduction, the committee says:

"For carrying out the provisions of the Federal highway act the committee recommends an appropriation of $17,700,000 for the fiscal year 1925. This amount compared with the appropriations for similar purposes for the fiscal year 1924 represents a decrease of $14,600,000 and is $800,000 less than the budget estimate. It is believed by the committee that appropriations sufficient to cover the actual withdrawals from the Treasury should be made, rather than appropriate to the extent of the authorizations. Based upon the estimated rate of expenditure, the effect of this policy will be at the close of the fiscal year 1925 there will be a balance in the highway fund of approximately $437,160.43."

The relative mileage of the various types of road being built in this country is indicated by figures given by the Bureau of Public Roads. These figures apply only to Federal-aid roads, but since they represent 25,000 miles of road now in use and include roads built in every state they may be taken as fairly representative of the character of the main highways. The 25,000 miles is divided by types as follows:

	Per cent
Gravel	39.1
Graded and drained	20.6
Cement concrete	18.3
Sand clay	10.8
Bituminous macadam	4.0
Bituminous concrete	3.1
Water-bound macadam	2.7
Brick	1.4

Complete figures covering all roads constructed and now in use would undoubtedly show somewhat higher percentages of the lower types of road, since the more important roads have been selected for improvement with Federal aid.

A model of a reinforced concrete arch bridge 7 feet long has been constructed by the bureau to determine just how masonry arch bridges should be designed when built on a skew. A skew bridge is one in which the roadway is not perpendicular to the abutments, as when a bridge crosses a stream diagonally. It has been found that the stresses in a skewed bridge are considerably different from those in a bridge of the same span built perpendicular to the abutments, and failures have occurred because this was not taken into account in the design.

Incorporated: Albany Crushed Stone Corp., Albany, $200,000 to $400,000.

The Midwest Quarries Company, Greencastle, Ind., is planning to rebuild the plant which was recently destroyed by fire on the site of the old plant which was destroyed. If everything goes according to present plans the new plant will be in operation by May 15. The new mill will be as modern and efficient as it can be.

It is rumored that a large cement plant will be located at Gaffney, S. C. Eastern capitalists are said to be interested in the deposits of stone at that point and have agreed to supply $3,000,000 capital.

South Ottawa Silica Co., Ottawa, Ill., has been incorporated by F. A. Cebulske, Thos. E. White, J. J. Schuneman.

Efficiency and Inefficiency

When men and machines are operating with a maximum efficiency, the business is prospering. When for any reason efficiency is lowered, production is decreased. In machine operation there are two causes for inefficiency: one the lack of knowledge in operating the machine or intentional mistake in operating it; the other, inefficiency in the machine itself.

In the first case it is always possible to obtain from the manufacturer sufficient information regarding the operation of the machine to insure its efficiency. If this information cannot be secured or if the machine continues to be inefficient after this has been done, the machine has then proved to be at fault. However, a machine should never be condemned until a thorough investigation has been made.

Recently a machine was installed under a certain guarantee by the manufacturer. Although the plant had a very capable and intelligent master mechanic, in less than a week he wired the manufacturer that the machine was inefficient and that he wished the company to take it back. Instead of doing this, the manufacturer sent a man to instruct the operator how to handle the machine. For one day the expert watched the operation of the machine and the next day he pointed out the mistakes which were being made. As soon as he had demonstrated the correct operation of the machine, he won for it the unqualified approval of the purchaser. Of course, he was pleased and satisfied to find that the machine was all that the manufacturer claimed it to be.

If a machine is inefficient, there is but one thing to do and that is to replace it with one that has been proved to be satisfactory. This involves a thorough study of catalogues and an investigation into the reputation which machines have made for themselves where they are used. This requires time and trouble and is well worth the effort.

All efficiency requires effort. A few years ago before machines had replaced hand labor, the skill of the workmen was the criterion for a successful piece of work. Now that machines are used almost exclusively, the relation of the workman to the job has changed. He must be efficient now but he uses his expertness in another way. As we have shown an inefficient method of operating a machine may render it almost useless. Hence, expertness in operation of equipment is important.

The greatest value of any cost keeping system is to ascertain when men and machines are efficient and not to wait to strike a balance from a ledger in order to know that money has been lost. A cost keeping system that does not do this from day to day is a poor one and any operator who is using such a system should take immediate steps to secure an adequate system. Then he will obtain proper information regarding the status of his organization and will be certain that he is operating with maximum efficiency.

Stone Competes With Gold

The statistical division of the California State Mining Bureau has estimated the value of the various minerals produced in 1923: petroleum leads with $195,000,000; cement ranks second with $17,000,000; gold, once California's leading product, is third with $13,250,000, and crushed rock, sand and gravel brought $12,000,000, within a million and a quarter of the value of the gold output.

New Association Officers

Officers for the new year were elected by the Indiana Crushed Stone Association at a meeting held in Chicago recently, as follows: President, C. E. Greely. St. Paul, Ind.; Vice-president, J. E. Baney, Kentland, and Secretary-treasurer, Fred W. Connell, Indianapolis. Members of the executive committee are: E. B. Taylor, Greencastle, Ind.; H. E. Blair, Toledo, O.; Greey and Baney.

The Edgerton Concrete Products Co. of Wilson, N. C., was organized recently with $100,000 authorized capital, and $13,000 subscribed by Yates, Claude, H. F. and Mrs. Yates Edgerton of Wilson, N. C.

New Engine Is Sturdy

The "Denison Powermaker," a new type of internal combustion engine, is an inverted, two-cylinder, four-cycle, water-cooled engine, entirely housed in a sixteen-gauge pressed steel casing. The cylinders, bearing standards and base are all included in one casting, which makes the unit very rigid, with permanent and proper alignment of piston, crank shaft and cam shaft. This also lowers the center of gravity over the entire unit.

The crank shaft, cam shaft, magneto governor assembly and the crank shaft, and also the connecting rods being located on top of the main base casting, are very accessible, so that adjustments can be quickly and easily made. The valve box, which includes the valves, intake and exhaust manifold and carburetor, can be quickly and easily removed by taking out six machine bolts.

Cooling water from the radiator, upon entering the cylinder block strikes the cylinder head, which is the hottest part of the unit, and raises as it is heated, producing rapid water circulation and uniform cooling. Air is drawn through the radiator, which is mounted at the rear of the main casting, by a fly wheel Sirocco type fan. The radiator is shrouded, so that the dust and dirt going through it with the air does not come in contact with any part of the working mechanism.

Power can be taken from the crank shaft at speeds ranging from 500 to 1200 r.p.m. and from the gear reduction shaft at speeds ranging from 250 to 600 r.p.m., giving a power range of from 5 to 12 h.p. from either shaft. The base dimensions of the Denison PowermakeR are 28¾ by 23¾ inches, and the height is 33 inches. It weighs 550 pounds.

The fuel tank is located at the top of the housing. Access to the working parts and the valve box compartment is effected by removing the iron cover, which is a sixteen-gauge pressed steel piece, and can be locked in place, making it impossible to tinker with the mechanism, by one who is not authorized to do so. The Cook Motor Co., Delaware, Ohio, who have been building internal combustion engines for twenty-two years, are the manufacturers of this new type of engine.

They Attracted Attention at Road Show

Two Plymouth gasoline locomotives exhibited by The Fate-Root-Heath Co., Plymouth, Ohio, at the recent Good Roads Show in Chicago, probably drew as much interest from visiting material producers as from the road builders. At the booth were shown a 7-ton locomotive and a 4-ton locomotive. Both are 4-speed, gear drive. Representatives of the company were kept busy answering inquiriies, thus attesting to the fact that industrial haulage is being closely studied as the medium for conveying materials from deposit to plant quickly and cheaply. Many producers are firm in their belief that such a system provides the best means of transportation that could be installed for their particular requirements.

New Easton Bulletins

New publications just issued by the Easton Car and Construction Company are *Bulletin 41* on Easton Won Way Cars and the fifth edition of *Quarry Car Practice.*

Bulletin 41 discusses the origin and development of the Won Way Car design and its varied applications to quarry work.

Quarry Car Practice, which contains 32 profusely illustrated pages, tells an interesting story of the many types of quarry cars used and methods of loading in vogue in the various kinds of quarry, including hand loading cars, home made cars, and side dump, contractors' type cars, gable bottom cars, Barney Car for moving cars up steep inclines, and many others.

U. S. Gypsum Earnings

The U. S. Gypsum Company for the year ended December 31, last, reported a net income of $5,030,922 after depreciation, depletion, Federal taxes and contingencies. This was equivalent, after preferred dividend requirements, to $15.59 a share earned on $5,911,680 common stock, par $20, compared with $12.18 a share earned in 1922.

New 1-R Air Motor Hoists

Among the new offerings in hoists is a line of air motor hoists in five sizes, with capacity of 500 to 10,000 pounds, announced by the Ingersoll-Rand Company.

The new hoists are said to be suited for a wide range of service, and are used in all manner of industries where rapid and economical lifting and handling of loads is desired. Many novel and distinctive features are claimed for them, as well as all the essential features common to conveyors of this type.

The manufacturers describes the outstanding characteristics of the new hoists as follows: Compactness of design resulting in low head room required; relative light weight; automatic brake which positively holds the the air supply be disconnected or fail; the air supply be disconnected or fail; and a graduated throttle which permits a very close regulation of both the lifting and lowering ends.

Low Freezing Dynamite

An ordinary straight 40 per cent dynamite which detonates without difficulty in a zero or a little under zero temperature is announced by the du Pont Powder Company. Tests recently conducted at Hibbing and Virginia in Northern Minnesota indicate, it is claimed, that this explosive was practically unaffected at the temperature mentioned. In the test made at 35 degrees below zero, it was shown that one cartridge would detonate another at one foot.

The development of the dynamite is described as the latest step in a series of developments of cold resisting explosives made over a period of years by the du Pont experts, and, it is claimed, makes possible the use of dynamite in road building and all kinds of open construction work under any temperature encountered in the United States.

W. C. Elsemore of Eureka, Calif., has opened a rock quarry between Eureka and Arcadia.

The Cleveland Stone Company, Cleveland, O., has declared an extra dividend of 1 per cent, payable March 1 to stockholders of record Feb. 15.

Chicago Automatic "Shaker" Screen

The story of the Chicago Automatic "Shaker" Screen, described as an absolute necessity for gravel pit operators, road contractors and the like, is told in an eight-page illustrated folder issued by the Chicago Automatic Conveyor Company of Chicago.

"Oh, how you dreaded to think of moving that cumbersome, bulky screening equipment to the next job. Not necessary now. The Chicago Automatic is light, simple and inexpensive."

This machine is a thorough-going conveyor loader, for pile to truck, car to truck or pile to hopper loading, but in addition it has also a shaker screen, and the product conveyed when handled by this equipment is separated into three sizes and distributed to three trucks or piles.

There are many variations of these operations possible with this machine.

New Hoist Is Handy

The Mead-Morrison Mfg. Co., of East Boston, Mass., long known as manufacturers of a complete line of steam and electric hoisting equipment, have developed a new portable gasoline hoist—known to the trade as the "Handihoist," in which are combined a number of distinctive features.

The new "Handihoist" is now in active use on a number of contracting jobs in the East, and has proved its ability to stand up under hard use. It is a single-drum machine, made double-drum by bolting on a second unit when desired. The hoist is equipped with cut gears, asbestos-lined frictions and brakes. It has bronze-bushed drums, machined all over. Power is supplied from a four-cylinder, heavy-duty LeRoi engine. The "Handihoist" is easy to operate, and is adapted to scraper, derrick, elevator and general hoisting work.

U. S. Gypsum Co., Chicago, and J. B. King & Co., 17 State street, New York, have amalgamated. J. B. King & Co. operates a fleet of plaster-carrying boats between Nova Scotia and the firm's main plant at New Brighton, Staton Island. The deal involves about $2,000,000.

New Armstrong Bulletin

A new Bulletin, No. 86, has been issued by the Armstrong Manufacturing Company at Waterloo, Iowa, which describes the Armstrong line of drills.

Armstrong drills are made of all steel construction, which fact is claimed as a special advantage in reducing expenses resulting from loss of time during breakdowns, by the elimination of all wood parts, thus making such breaddowns unusual occurences. The center of gravity is low, all shaft bearings being mounted directly on the main sills.

The Armstrong Patent Shock Absorbing Wire Line Derrick, it is claimed, saves 75 per cent of the cable expense. The Reversing Mechanism is given as a most important feature of the Armstrong All-Steel Blast Hole Drill, which being built into the type No. 50 Blast Hole Drill, is an exclusive feature, designed in the Armstrong shops for use only in Armstrong Machines. This feature provides a flexibility of control claimed to be very superior.

The Dixie Machinery Mfg. Company of St. Louis announce the issuance of a new publication, Dixie Bulletin No. 45, on Dixie Series 3600 Ball Bearing Hinged Hammer Crushers and Pulverizers, soon to be off the press.

Sweet's Chicago Office

Sweet's Steel Company of Williamsport, Pa., announce that on and after March 1 their Chicago office will be located in the Peoples' Gas Building. Sweet's Steel Company manufactures steel rails in weights from 8 to 60 pounds, portable tracks of the bolted and riveted type, angle type and plain type rail joints and steel ties 3, 4 and 5 inches wide. In addition, they carry spare track parts in stock and also a line of switches and frogs.

New Falk Official

The Falk Corporation of Milwaukee announces the retirement of its secretary and treasurer, E. A. Wurster, who has been with the company since its organization. He is succeeded in this office by Clarence R. Falk.

Conquering the Earth

Printed on heavy paper with artistic type and bound between gray board covers, "Conquering the Earth" is described by the Hercules Powder Company as "An Elaboration of Events Through the Ages from Stone Hatchets to Dynamite, Upon Which a Series of Historical Advertisements Was Based."

These advertisements, which have appeared in the trade press periodically during the past year or so, constitute an interesting series of art and word pictures mirroring ancient methods of quarrying and building, commencing with Solomon's Temple, and containing the natural comparison with modern methods in which explosives such as "Hercules" enter so importantly. Each ad is illustrated with an art drawing.

Blaw-Knox Changes

Robert T. Harris, who has been located at the New York office, has been transferred to Baltimore as district sales manager for all the products of the Blaw-Knox Company.

Walter H. Duncan, formerly field engineer for John F. Casey Company, contractors, has joined the sales staff of the Road Equipment Department of Blaw-Knox Company.

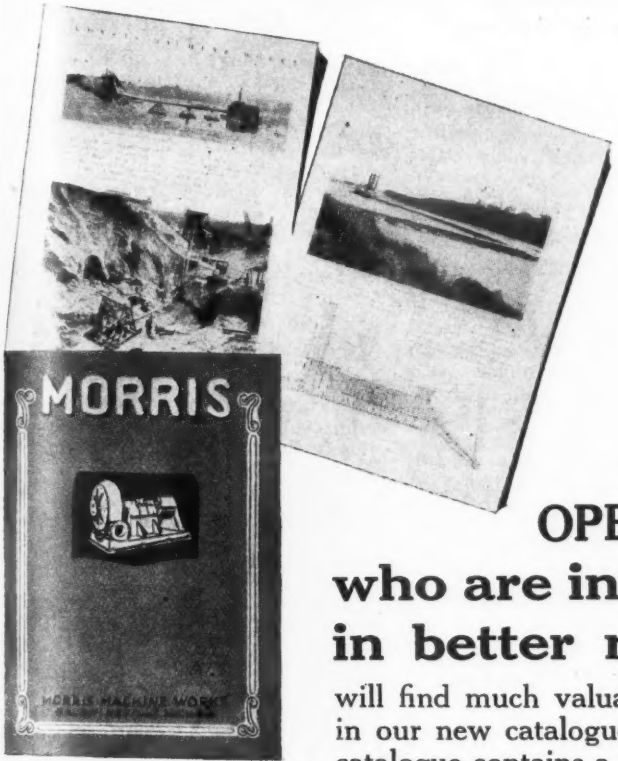
William F. Glasser, formerly engineer in the Heavy Forms Department of the Blaw-Knox Company, has been promoted to Assistant Chief Engineer of the department.

Charles K. Wehn, formerly located at the company's Chicago office, has been transferred to the Pittsburgh office, as district manager of the Standard Steel Building Department at Pittsburgh.

R. D. Spradling, who has been located at the Baltimore office, has been made district manager of the Standard Building Department at Chicago.

The Speedway Gravel Company is opening a plant at Big Eagle creek and West Michigan street, Indianapolis.

The Niagara Sand Corp. of Buffalo, N. Y., increased its capital stock from $80,000 to $200,000.



SAND AND GRAVEL OPERATORS

who are interested in better methods

will find much valuable information in our new catalogue No. 20. This catalogue contains a wealth of useful data and information on pumping operations.

In addition to valuable pumping information, Catalogue No. 20 does much to explain why Morris pumps are making good in every part of the world. It shows you what you may expect in your plant from a Morris Pump.

Your copy is ready and at your request will be mailed immediately.

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See P&Q HAND BOOK
Page 328

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Realty Bldg., Charlotte, N. C.
Forrest Bldg., Philadelphia, Pa.
H. A. Paine, Houston, Texas
Engineers Bldg., Cleveland, Ohio

A New Loomis Arrives

A new model of the Loomis "Clipper" Blast Hole Drill is announced by the Loomis Machine Company in Bulletin "CR-44:" The new machine is equipped with crawler tractor rear wheels.

This drill, designed for contractors, quarries, ore bodies, stone, lime and gypsum plants, railroad cuts, dewatering holes and other uses, is described, because of its crawler wheel, as being especially adapted to soft surfaces and where a liberal wheel base with increased traction surface is desirable. It is also made with Round Tractor Wheels and in Non-Tractor Portable.

The machine has a new style Patented and Improved Loose Crank which starts and stops the tools instantly by the mere push of a lever. It has Patent Wheel Rest, Patent Rope Saver, is built with low point of gravity, and is said to be simple, durable, effective, and easily operated and maintained.

"Pennsylvania" Crushers

According to Bulletin 1014, recently issued by the Pennsylvania Crusher Company, which describes briefly "Pennsylvania" Steel-built Hammer Mills for cement, lime and gypsum plants, these mills are the product of 25 years of study and experience in plant manufacture.

"Pennsylvania" Mills are made for the secondary and finer reductions of limestone, cement rock, gypsum, shales and similar materials in the process of manufacturing cement, lime and gypsum products, and for brick, chemical and other plants.

A company was formed at Liberty, Mo., January 29, by Kansas City, Chicago and Indianapolis men to quarry rock for road construction work. Thirty-five acres of land was purchased from T. S. Woods, a farmer near Smithville, for $500 an acre.

A new granite quarry is being opened up at Lakeside, Calif., by W. A. Meyer of the Eucalyptus ranch. Remunerative prices and steady demand are expected. The concern purchased the machinery and equipment of the Verruga Marble Co. near Verruga.

Osgood Folders

"What they are doing with O goods" is the message of three ne folders issued by The Osgood Co pany, of Marion, O. "The Shovel Many Uses" is pictured in the var ous capacities in which it is bei used, i.e., loading from pile to ra road and unloading cars, pile to bi for grading railroad right of wa equipped with a Skimmer scoop f tearing up and grading streets wi shallow cut, grading city streets, ri ping up old pavements, rough ro digging in Colorado, road buildi through marshy land with Osgood yard Continuous Tread Dragline Ou fit, cutting clean path in quarr equipped with pile driver leads, wor ing in flooded ground.

Charles Edison Assumes Control

Stating that "Titles don't mea much around here," Charles Edison son of the great inventor, has suc ceeded Stephen B. Mambert as man ager of the Edison Portland Cemen Company, and incidentally as financia advisor in the 34 corporations of th Edison industries.

McMyler's New Convertible

"More than forty years ago"—say *Bulletin No. 59, just* issued by the Mc Myler Interstate Company at Mil waukee, "—long before the Spanish American War—McMyler-Interstat whirlies, in fact, were the forerun ners of modern locomotive cranes. Many of these whirlies are still op erating today after 25 or 30 years o active service."

The No. 2 Convertible crane an shovel representing the latest Mc Myler development, has the sam rugged characteristics, they say, a the old whirlies, incorporating as does the tried and proven construction details of the old machines.

The bulletin, beautifully printed i two colors, illustrates in detail th construction of the new machine.

Dallas Sand & Gravel Company Dallas, Tex.: capital stock $1,600. In corporators: Y. J. Hawkins, H. A Turner and A. Bevacqua.